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OF
OPHTHALMOLOGY

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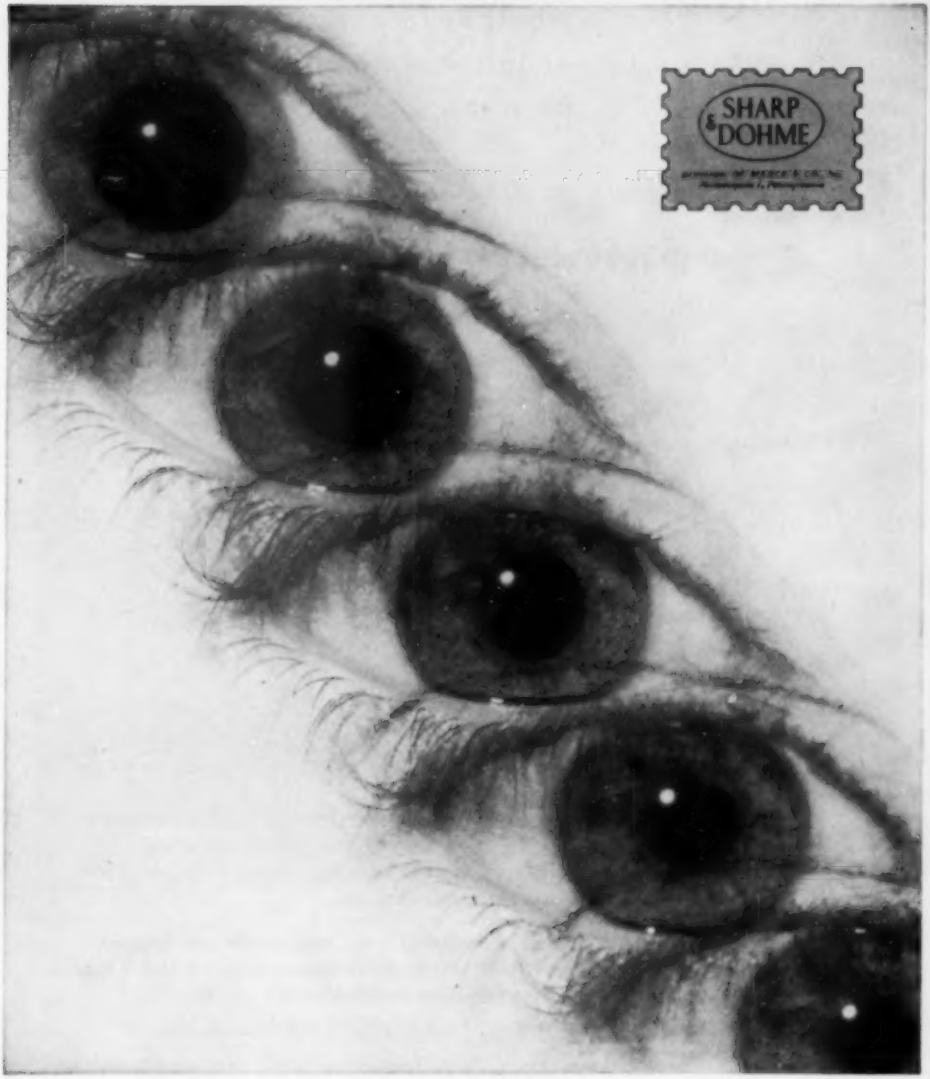

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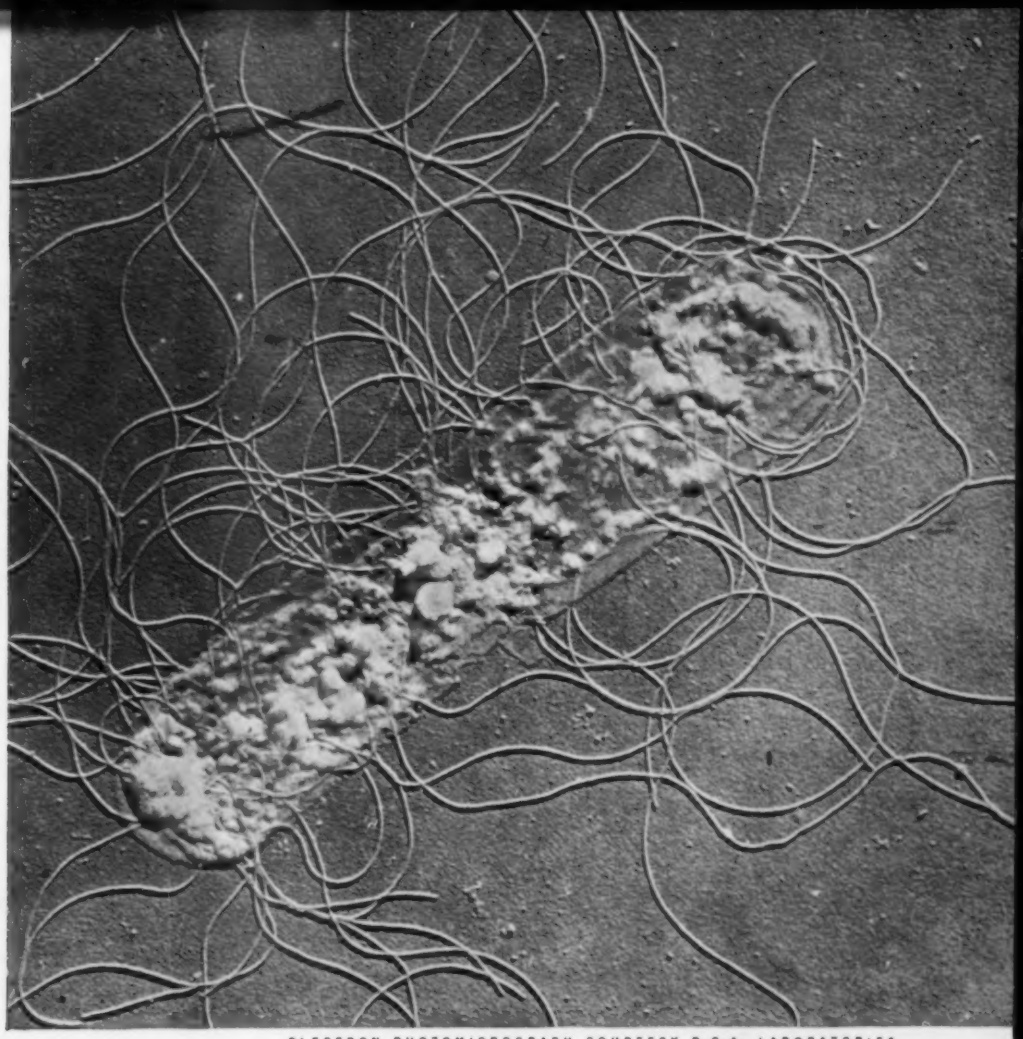

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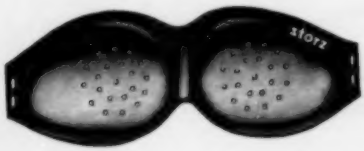

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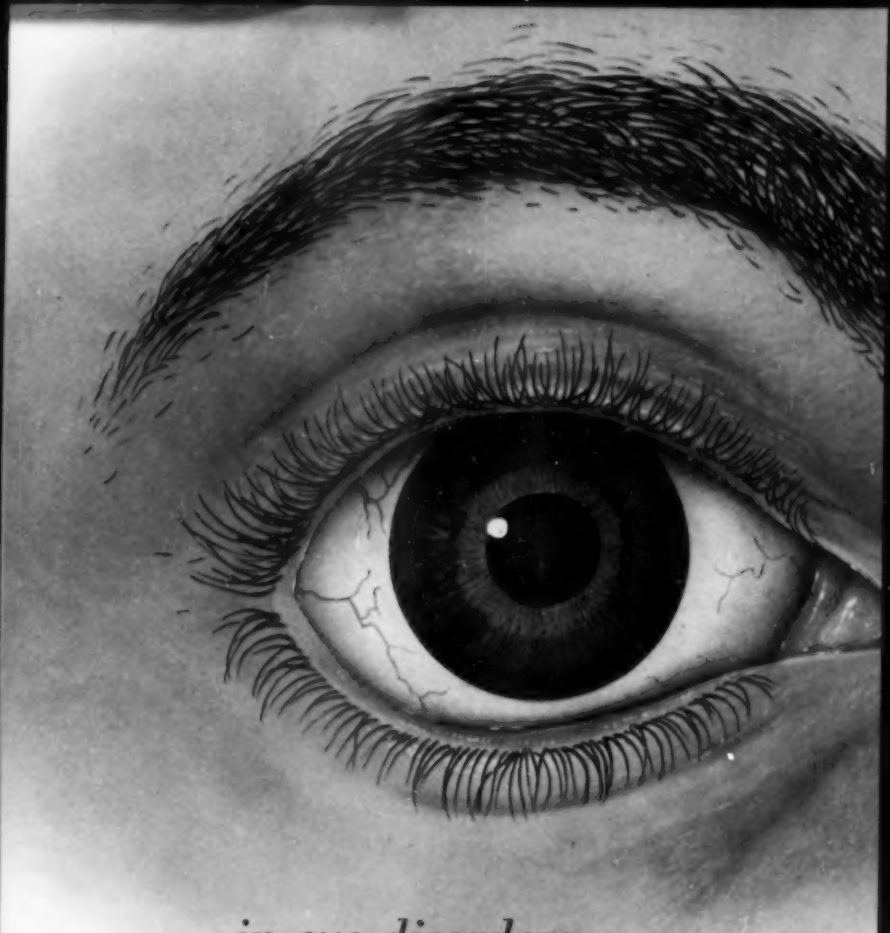

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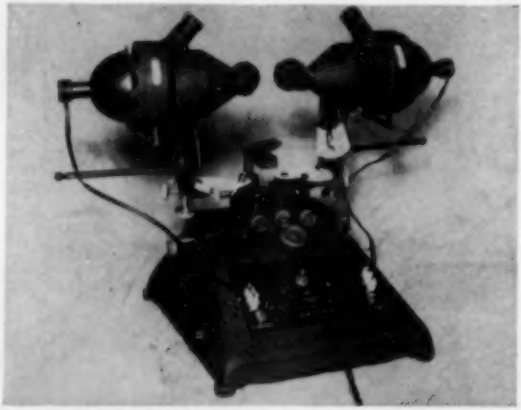

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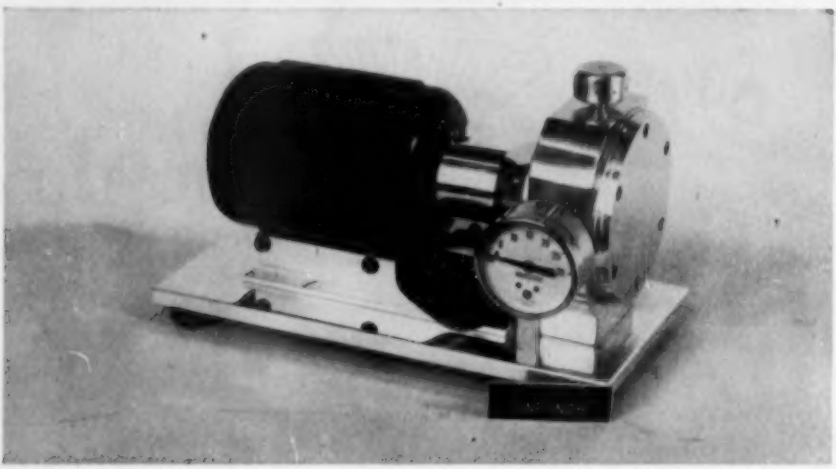

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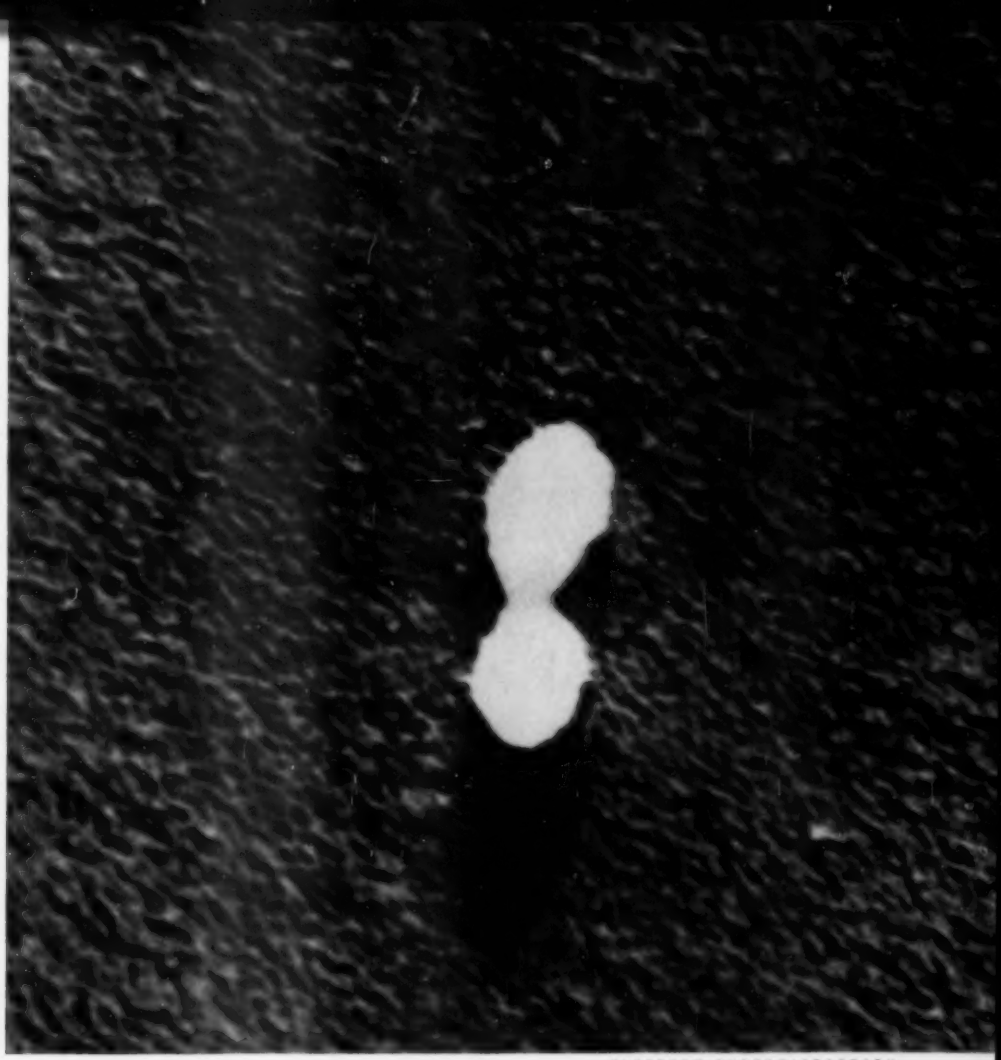

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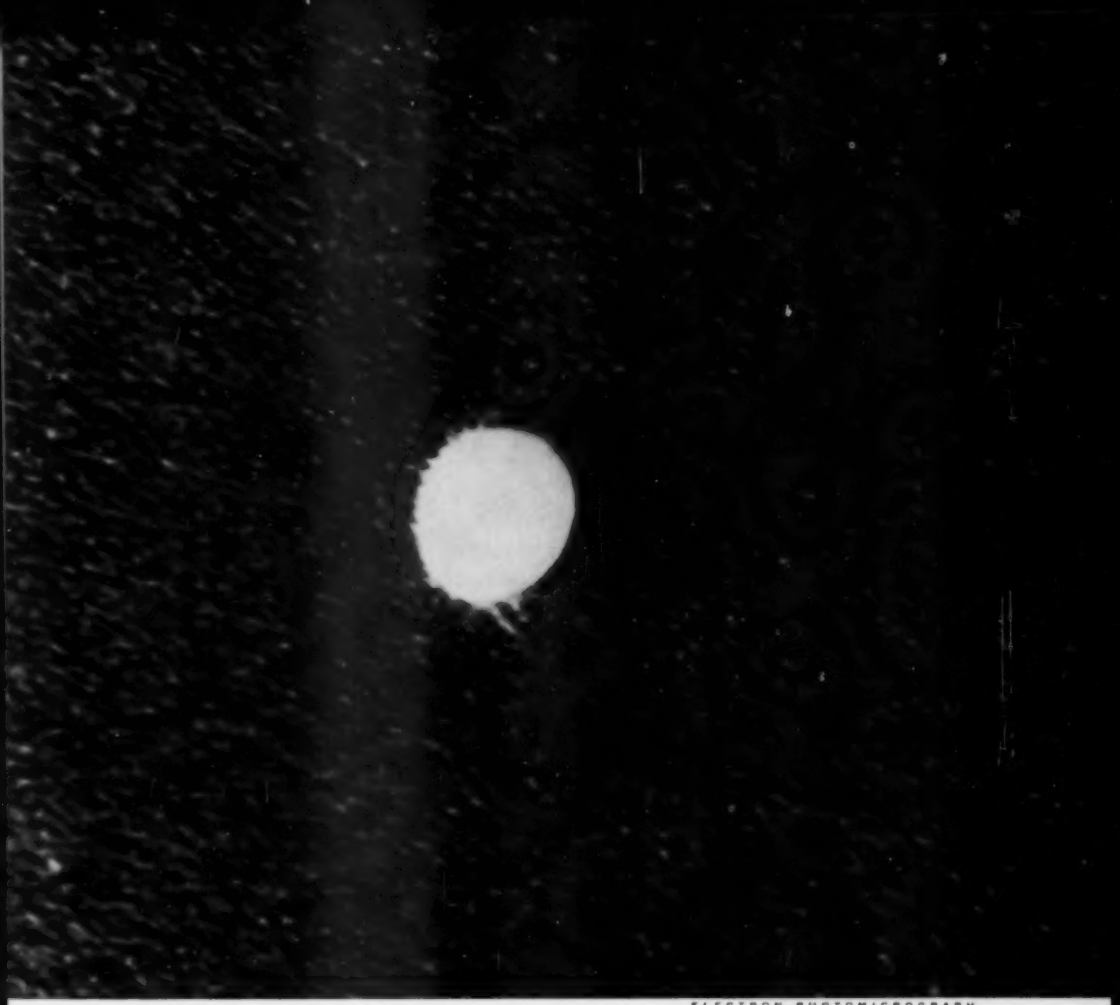

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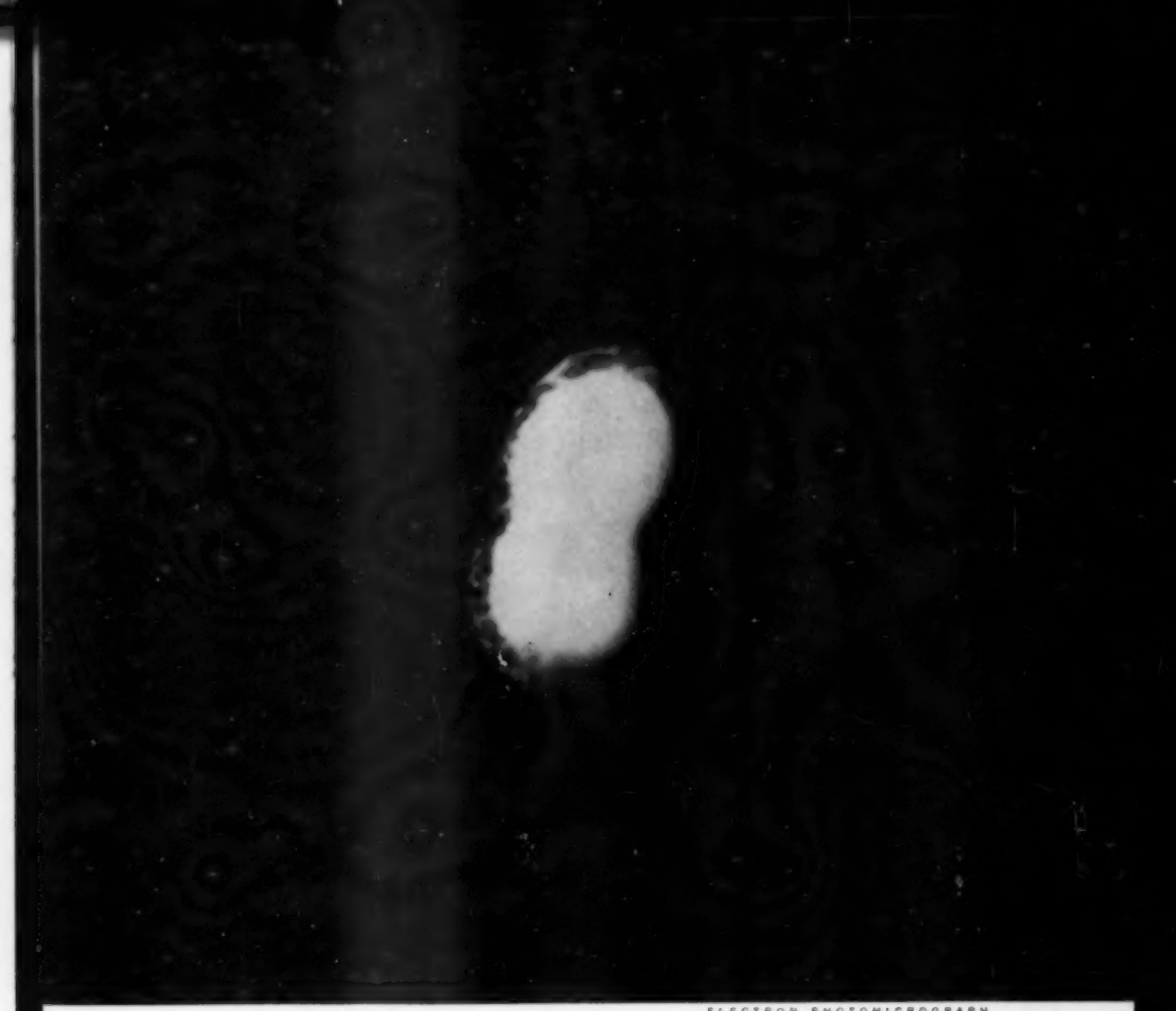

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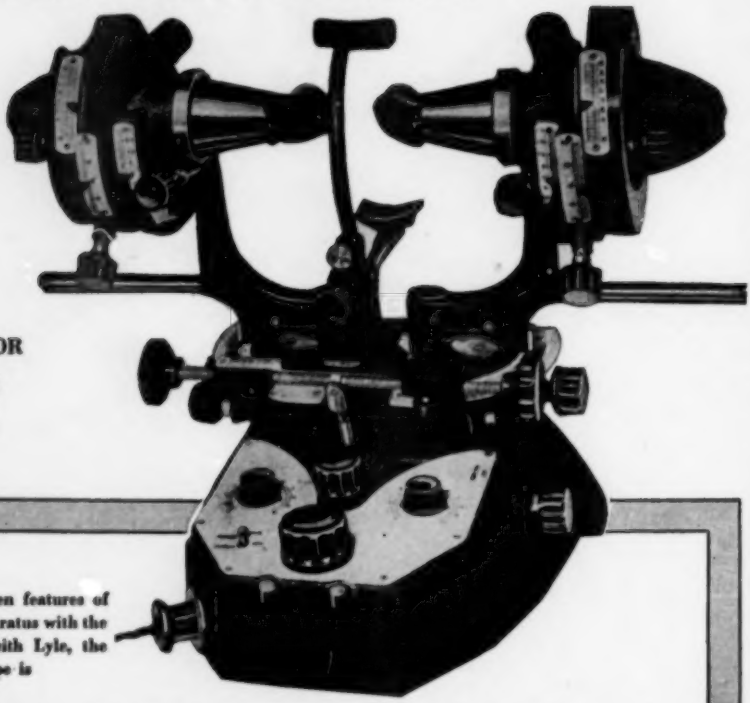

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1. Getter, B. C., and Leopold, I. H.: A. M. A. Arch. of Ophth. 49:24 (Jan.) 1953.
2. Stolzar, I. H.: Am. J. Ophth. 36:110 (Jan.) 1953.

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AMERICAN JOURNAL OF OPHTHALMOLOGY

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ABSTRACTS

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 38 DECEMBER, 1954 NUMBER 6

THE BLINDSPOT MECHANISM IN STRABISMUS*

THE TENTH SANFORD R. GIFFORD LECTURE

KENNETH C. SWAN, M.D.
Portland, Oregon

It is an honor to be asked to present a lecture given in memory of Dr. Sanford R. Gifford. Dr. Gifford was beloved as a man and admired as a teacher, clinician, and contributor to the progress of ophthalmology. The blindspot mechanism in strabismus seems an appropriate subject because Dr. Gifford wrote seven papers concerning binocular vision and its anomalies. Primarily, he was interested in improving surgical methods; however, he emphasized that the major function of the oculomotor system was to permit the two eyes to function together as receptors of light.

How are the light sensations of the two eyes mentally integrated into single impressions? William Wells, a London physician of American birth, probably was the first to recognize that integration of sensations of direction of the two eyes was the essence of normal binocular single vision. As early as 1792, Wells[1] wrote: "Objects anywhere in the horopter will be seen as single because the apparent directions of the two eyes will then completely subside and, for a contrary reason, those placed in the other part of the plane in the optic axes will double."

What did Wells mean by visual direction? First, consider it in monocular vision. Every retinal area has an inherent and constant directional value in relation to every other retinal area in the same eye. This can be demonstrated if two retinal areas are stimulated simultaneously. Then the observer will be aware of two distinct light patterns, each seeming to come from a different direction in accordance with the anatomic location of the stimulated rods and cones (fig. 1). The apparent position in space of an object relative to surrounding objects, therefore, will be in accordance with the manner that light from these objects is patterned on the retina.

Now, if a Maddox double prism is placed before one eye, rays of light from a single object in space are divided and made to fall upon two retinal areas in the eye (fig. 2). These areas have different directional values; therefore, the object is seen in two directions.

This is monocular diplopia of physical origin. It demonstrates that seeing the same object in two visual directions is the basis of diplopia. Also it can be deduced from this that, when an object in space is viewed binocularly, it will not appear single unless it is seen in a common visual direction by the two eyes.

How does this occur in normal vision?

The two retinas can be considered functional counterparts in that anatomically corresponding areas, such as the right halves of the two foveas, normally have a common visual direction. If these two areas are stimulated simultaneously by mechanical or other means, light sensations from the two eyes appear superimposed.

The normal anatomy of the visual pathways and center provides some basis for this (fig. 3). Each point of binocular single vision normally is imaged on corresponding areas in the two retinas. The pathways from these

* From the University of Oregon Medical School. Presented before the Chicago Ophthalmological Society, February 5, 1954.

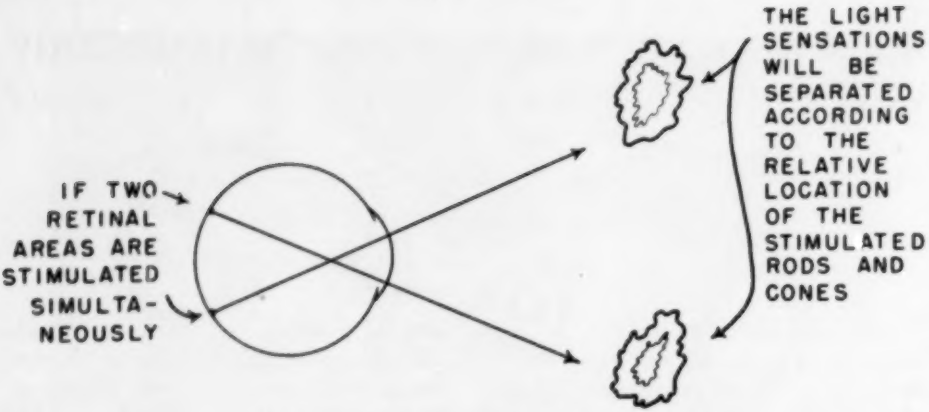
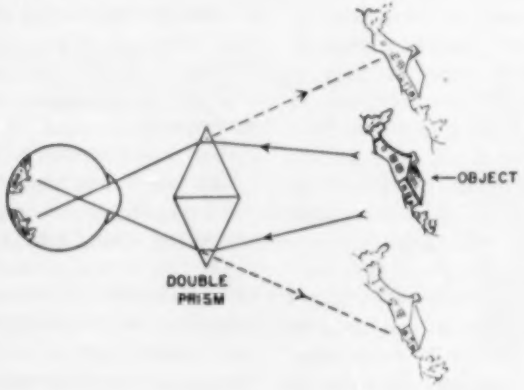

IF TWO RETINAL AREAS ARE STIMULATED SIMULTA-NEOUSLY
THE LIGHT SENSATIONS WILL BE SEPARATED ACCORDING TO THE RELATIVE LOCATION OF THE STIMULATED RODS AND CONES

Fig. 1 (Swan). Demonstrating visual direction.

two areas become closely related in the optic radiations and terminate in the same cortical area.

It can be said, therefore, that normally there is a certain correspondence between the anatomy of the two retinas including their central connections and function in relation to visual direction. This normal (directional) correspondence permits binocular single vision, but the fields of the two eyes must be so overlapped that the visual axes intersect at or near the point of fixation. The oculomotor system normally makes this possible.

Now consider the symptoms resulting from malalignment of the visual axes in an adult with good vision in each eye. The object of regard is imaged on the fovea of the fixating eye and on an extrafoveal area in the deviating eye. These retinal areas do not have a common visual direction; consequently, the object is seen in two directions, that is, doubled. This is the mechanism of binocular diplopia (fig. 4).



RAYS OF LIGHT FROM A SINGLE OBJECT ARE DIVIDED AND MADE TO FALL ON TWO RETINAL AREAS; THEREFORE, THE OBJECT IS SEEN IN TWO DIRECTIONS.

Fig. 2 (Swan). Demonstrating monocular diplopia of physical origin.

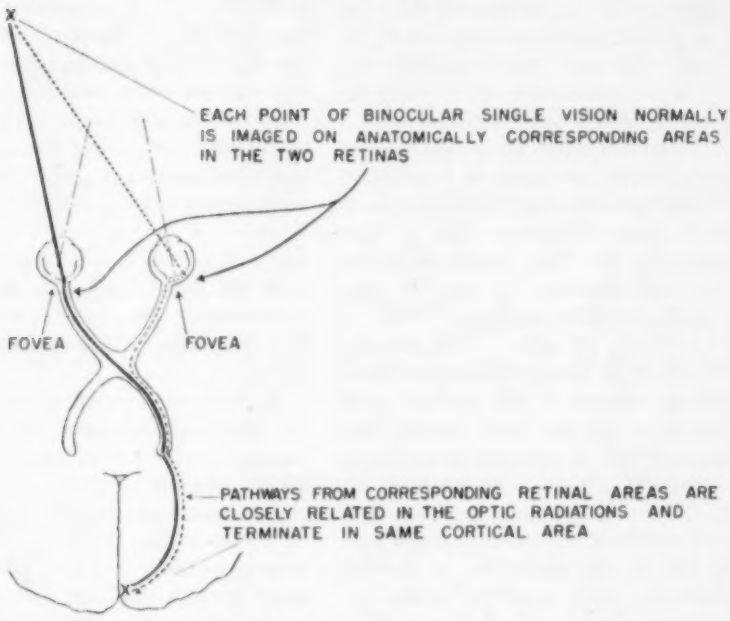

EACH POINT OF BINOCULAR SINGLE VISION NORMALLY
IS IMAGED ON ANATOMICALLY CORRESPONDING AREAS
IN THE TWO RETINAS
FOVEA
FOVEA
PATHWAYS FROM CORRESPONDING RETINAL AREAS ARE
CLOSELY RELATED IN THE OPTIC RADIATIONS AND
TERMINATE IN SAME CORTICAL AREA

Fig. 3 (Swan). The anatomic basis for normal (directional) correspondence.

Not everything in the patient's field of vision will appear double to him. Instead, his primary complaint would be seeing as double only that object which had received his attention, that is, the object of his conscious regard. He would be unaware of diplopia in his peripheral fields of vision unless he were to concentrate his attention there. In this re-

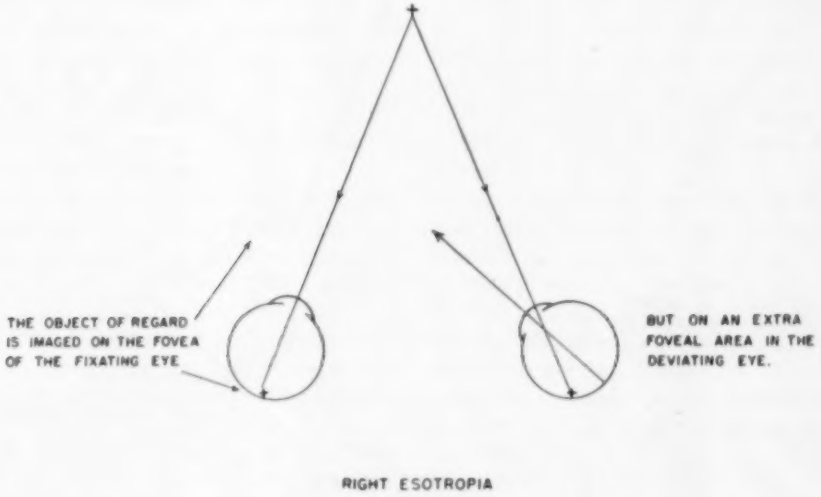


Fig. 4 (Swan). Binocular diplopia.

spect, diplopia in the peripheral fields of vision in heterotropia is comparable to the "physiologic diplopia" which normally occurs when we concentrate our attention on a near object while fixating a distant one.

If it is true that a persistent awareness of diplopia is limited to objects in the fixation area, a child with comitant strabismus would not need to suppress the entire field of vision of his deviating eye. There is evidence that he does not. deSchweinitz[2] reported that with prisms and colored lenses diplopia could be created in nearly all patients with comitant strabismus. Later, Travers[3] and others found suppression scotomas to be relatively small and limited to specific areas. In my own studies of the field of binocular perception in more than 500 children with comitant esotropia, I did not find total suppression of vision in the deviating eye in a single case. It was only in the central area of the field of binocular vision that perception was monocular.

In comitant strabismus, what mechanisms make monocular vision possible in the central field? One mechanism is suppression. In suppression, rays of light from the object of fixation fall on an extrafoveal region in the deviating eye. The visual sensations from this region are said to be suppressed because they do not reach consciousness (fig. 5). Furthermore, with suppression, the stimulus to fusional movements seems disrupted so that malalignment is perpetuated. A second mechanism functions in the relief of diplopia in cases of esotropia with a deviation of about 12 to 18 degrees. Then rays of light from the fixation area fall upon the optic nervehead of the deviating eye (fig. 6). I have designated this as the blindspot mechanism.

In 1947, I[4] reported studies of the field of binocular perception in 296 cases of comitant esotropia in older children and adults. Mirrors or filters and twin projection systems were used to separate the fields of vision of the two eyes. This permitted plotting of the field of perception of the deviating eye while the opposite eye was fixating an object at six meters.

Of the 296 patients there were 80 in whom I found the physiologic blindspot of the deviating eye to be overlying the point of fixation so that this area was visualized only

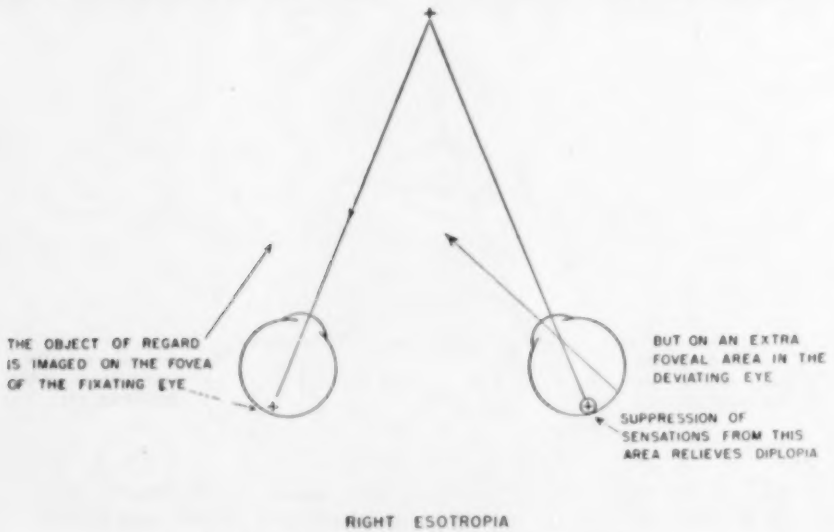


Fig. 5 (Swan). Alleviation of diplopia by suppression.

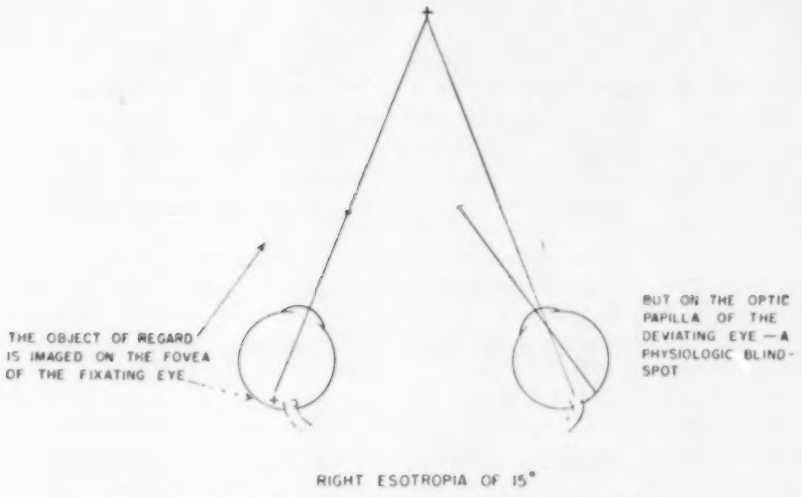

THE OBJECT OF REGARD IS IMAGED ON THE FOVEA OF THE FIXATING EYE
BUT ON THE OPTIC PAPILLA OF THE DEVIATING EYE — A PHYSIOLOGIC BLIND-SPOT
RIGHT ESOTROPIA OF 15°

Fig. 6 (Swan). Alleviation of diplopia by the blindspot mechanism.

by the fixating eye.

At the time of these studies I was unaware that in 1792, George Adams, optician to His Royal Highness, Prince of Wales, had considered the possibility that the blindspot created by the optic nerve might provide a mechanism for the relief of diplopia in esotropia. In discussing possible explanations for single vision in strabismus Adams[8] wrote, "If the diverging eye is not so directed, picture of the object falls upon that part of the retina where the optic nerve enters and where there is no vision. This is probably the case in the squint where the axes of the eyes converge so as to meet about six inches before the nose."

During the past decade, I have attempted to determine the various roles that the physiologic blindspot of the deviating eye might play in esotropia. First consider its position in eso-deviations of various magnitude (fig. 7). If the deviation is in the order of eight to nine degrees, the blindspot of the deviating eye lies in a homolateral position adjacent to the fixation point. If it is about 15 degrees, the blindspot overlies the fixation area. Then if the deviation is in the order of 22 degrees, the blindspot of the deviating eye again lies adjacent to the fixation point but is in a contralateral position in the visual field. Thus it can be seen that in an esotropia of moderate magnitude the physiologic blindspot of the deviating eye covers an appreciable part of the fixation area, and, therefore, plays an important role in the alleviation of diplopia, either alone or in association with suppression.

Patients in whom the blindspot mechanism of the deviating eye definitely and consistently overlies the fixation area merit diagnosis because they require different treatment from those patients with suppression.

How is the blindspot mechanism recognized?

First it is probably operative if the magnitude of the deviation is consistently between 12 to 18 degrees of esotropia. Then if diplopia results when the deviation is so altered that the blindspot is shifted off the fixation area, the mechanism is certainly the primary one which relieves diplopia. A prism held before the deviating eye can be used to displace the blindspot of this eye from the central area. This is the simplest method of demonstrating that a double image of the object of fixation can be created under or-

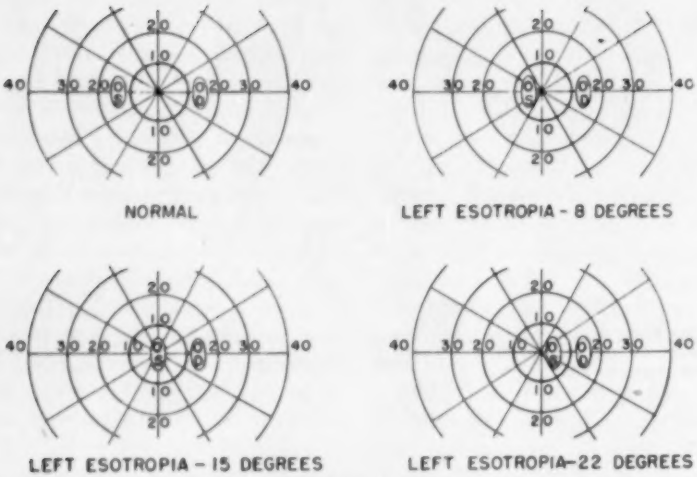


Fig. 7 (Swan). Position of blindspots in the field of binocular vision in left esotropia.

dinary visual circumstances.

In previous publications, I[6] have described the details of localizing the physiologic blindspot in the field of binocular perception. Testing is performed in an illuminated room to simulate ordinary visual conditions. The patient wears spectacles with a red filter before one eye and a green filter before the other as in the Lancaster test. When both the red and the green targets are superimposed on the screen at a distance of five to six meters, only one is perceived by the patient if the blindspot mechanism is operative. The area of monocular perception then can be plotted. It will correspond in size and shape to the physiologic blindspot.

In studying many hundreds of patients with estropia, I have found a blindspot mechanism to be operative in a number of circumstances but, from the viewpoint of clinical management, four groups of cases merit special consideration (table 1).

The first group have no sensory anomalies. These patients are designated as having the "blindspot syndrome." Then there is one group of patients with amblyopia and another group with anomalous correspondence who may utilize the blindspot mechanism. In a fourth major group of patients, the blindspot of the deviating eye is the nucleus of a suppression scotoma. This fourth group of patients will be discussed in a later publication.

I[8] first described the blindspot syndrome in 1947. With additional experience, I have revised some of its features. Patients with the blindspot syndrome have a persistent esotropia of 12 to 18 degrees for both distant and near fixation. There may be a co-existing vertical deviation as large as five to six degrees. Visual function and correspondence are normal. Diplopia always can be created under ordinary visual conditions by eliminating the deviation with prisms. In fact, transitory diplopia is a symptom admitted by nearly all of these patients. Also, the object imaged on the fovea of the deviating

TABLE 1

MAJOR GROUPS UTILIZING THE BLINDSPOT MECHANISM

I. Blindspot syndrome. No sensory abnormalities
II. Blindspot mechanism with amblyopia
III. Blindspot mechanism with anomalous correspondence
IV. Blindspot mechanism with suppression

eye occasionally may come to the attention of the patient. Then he sees it superimposed on the fixation area. This is spoken of as confusion of images.

When the patients with the blindspot syndrome are examined on a haploscopic instrument such as the major amblyoscope, good potentialities for normal binocular single vision are found. When the instrument is aligned in accordance with the deviation these patients are capable of fusion with stereopsis. Usually some amplitude of fusional movements can be demonstrated. The features of the blindspot syndrome are summarized in Table 2.

The blindspot syndrome most commonly develops in long-standing estropia associated with uncorrected hypermetropia or anisometropia. This was the most common circumstance in the first group of patients whom I reported; however, I no longer consider hypermetropia an essential part of the blindspot syndrome because it may develop in the absence of an appreciable refractive error. Most frequently, this occurs in patients who have had a deviation of large magnitude which has been partially corrected by surgery.

In my earlier studies, it seemed that the blindspot syndrome developed only in patients with strabismus of nonparalytic origin. Now it has become evident that the mechanism may play an important role in relief of diplopia resulting from paresis of one or more of the extraocular muscles if the deviation is comitant in the central fields of vision.

Most important of this group are children with congenital paresis of vertically acting muscles. These children frequently develop an esotropia because the vertical deviation makes a normal binocular single vision impossible. Then they may utilize the blindspot mechanism because it permits a vertical deviation of as much as five or six degrees to be present without double vision. Recognition of the underlying vertical muscle anomaly is paramount to the proper treatment.

TABLE 2

BLINDSPOT SYNDROME

1. Occasional diplopia and confusion of images
2. Esotropia of 12 to 18 degrees
3. Blindspot of deviating eye consistently overlies fixation area
4. Good vision in each eye
5. Normal correspondence
6. Good fusional potentialities demonstrable on haploscopic devices

I have observed two adults with acquired paresis of one lateral rectus muscle who have utilized the blindspot as a central scotoma when their deviation had become comitant. Also, I have noted the syndrome in a middle-aged woman who had developed a persistent horizontal and vertical deviation following subsidence of orbital edema in Graves' disease. For nearly a year, she had diplopia but for cosmetic reasons she did not wish to wear a monocular occluder. Her deviation gradually became comitant. Then she began to use the blindspot of the deviating eye as a central scotoma with resultant relief of all but transitory diplopia and occasional confusion of images. She has preferred to continue without operative treatment.

In the past decade, my colleagues and I at the University of Oregon Medical School have undertaken treatment of more than 200 patients with the blindspot syndrome. Most of these patients have been observed less than five years so that a significant statistical analysis of the results of treatment has not been feasible; however, most have developed comfortable binocular single vision when treatment could be carried to completion. Elimination of the deviation or its reduction to a few prism diopters has seemed the most important prerequisite to the establishment of normal fusion under ordinary visual conditions.

I emphasize this because if the deviation is only partially corrected so that fusion is not possible under ordinary visual conditions, the deviation tends to increase until the patient again is utilizing the blindspot mechanism and is free of diplopia. When the

patients are relieved of diplopia by the blindspot mechanism, they also seem to lose the stimulus of fusional movements. This seems the probable reason why the blindspot mechanism tends to stabilize the deviation at about 15 degrees.

In an occasional patient in whom a large refractive error of hypermetropia has been neglected, elimination of the deviation may be accomplished by the prescription of glasses which eliminate the excessive accommodative effort required for these patients to have clear vision; however, in the majority of our patients, surgery has been required, alone or in addition to lenses.

If an appreciable amount of hypermetropia is present it seems wise to prescribe the full correction and defer surgery until the stability of the deviation is determined with certainty. Then the surgical correction should be directed toward elimination of that deviation which persists when correcting lenses are worn. In very young children, it also should be kept in mind that eso-deviations and hypermetropia generally lessen with growth and development of the child into an adult.

In about half of our patients with the blindspot syndrome, binocular single vision under ordinary visual conditions has occurred spontaneously after the deviation has been eliminated by surgery. Many others have required postoperative orthoptic training before an adequate amplitude of fusional movements developed.

A common postoperative circumstance has been to find the child using the normal binocular mechanism for distant fixation and the blindspot mechanism for near vision. Orthoptic training is indicated in these cases if the child is old enough to co-operate; otherwise, a reading addition or miotics may be helpful by reducing the effort of accommodation until the fusional mechanism becomes stabilized. These measures are imperative to keep the child from slipping back into the blindspot syndrome. Whereas orthoptic training to increase the amplitude of fusional movements often is of value in stabilizing binocular single vision postoperatively, I have not found prolonged and intensive preoperative training to alter the prognosis. In recent years I have used preoperative training only long enough to demonstrate that there were potentialities for developing a good amplitude of fusional movements. Then if intensive training is required postoperatively, the child is more apt to maintain his interest and concentration for an adequate period.

Suppression, amblyopia, and anomalous correspondence, the great sensory obstacles to normal fusion, are lacking in the blindspot syndrome; consequently, correction of the motor anomaly, that is, the deviation, offers an excellent opportunity for the establishment of comfortable binocular single vision. Yet there are some in whom treatment may not seem justified. For example there are some older individuals who are asymptomatic and who have a large angle kappa so that the esotropia is not conspicuous (fig. 8).

Also, I am reluctant to advise surgical correction of the deviation if there is gross anisometropia because these patients are not likely to develop a stable fusional mechanism postoperatively even though correspondence and vision are normal and there is no suppression. I have observed that their visual axes frequently shift either back toward the original deviation or that a post-

Fig. 8 (Swan). This right esotropia of 12 degrees is relatively inconspicuous because the patient has a wide angle kappa.

operative exotropia develops. With these few exceptions, it is desirable to attempt to establish normal binocular vision in patients with the blindspot syndrome.

One of the outstanding features of the blindspot syndrome is the absence of sensory anomalies. Patients with amblyopia and anomalous correspondence may use the blindspot mechanism but are excluded from the blindspot syndrome because these anomalies modify the symptoms, significantly alter treatment, and lessen the prognosis.

Consider first those patients with amblyopia in the deviating eye. They may utilize the blindspot mechanism because amblyopia plays no role in relief of diplopia. In amblyopia there is impaired perception of visual sensations arising from the fovea, whereas in diplopia, the second impression of the object of regard does not originate from the fovea of the deviating eye but from an extrafoveal area (fig. 4). Previously, I reported that the blindspot syndrome developed in association with the elimination of diplopia in some patients, but additional evidence indicates that these events were coincidental.

Does amblyopia permit the patient with esotropia to make a better adaptation to the malalignment of his visual axes? From experience in studying patients with the blindspot mechanism, I am convinced that amblyopia does serve a purpose in some cases. Patients with the classical blindspot syndrome occasionally notice the object imaged on the fovea of the deviating eye to appear superimposed on the object in the fixation area. This is spoken of as confusion of images (fig. 9). This symptom is lacking in patients with amblyopia in the deviating eye. In these patients, amblyopia might be considered a mechanism which alleviates confusion of foveal images and, therefore, provides the patient with a better adaptation to his deviation.

Treatment of patients who utilize the blindspot mechanism and have amblyopia is more difficult and the prognosis is not as good as in the blindspot syndrome. From experience with 41 of these patients, I am convinced that every effort should be made to overcome the amblyopia before surgical elimination of the deviation is considered.

If the amblyopia persists the patient gen-

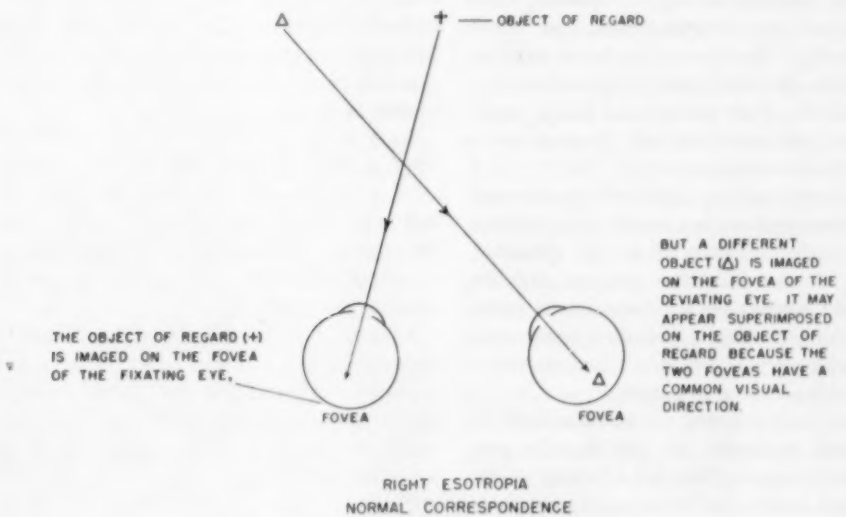

Δ
+ — OBJECT OF REGARD
BUT A DIFFERENT OBJECT (Δ) IS IMAGED ON THE FOVEA OF THE DEVIATING EYE. IT MAY APPEAR SUPERIMPOSED ON THE OBJECT OF REGARD BECAUSE THE TWO FOVEAS HAVE A COMMON VISUAL DIRECTION.
THE OBJECT OF REGARD (+) IS IMAGED ON THE FOVEA OF THE FIXATING EYE.
FOVEA
FOVEA
RIGHT ESOTROPIA
NORMAL CORRESPONDENCE

Fig. 9 (Swan). Confusion of images.

erally will lack a strong fusional mechanism. As a result, the improved alignment achieved by surgery is not likely to be maintained. The later development of exotropia is common. In fact, exotropia developed without surgery in two of my patients when they reached adolescence.

If, in addition to persistent amblyopia, a young child with the blindspot mechanism also has a high degree of hypermetropia or anisometropia, surgical correction of his esotropia should be deferred. If, on the other hand, the amblyopia is eliminated by occlusion alone or with orthoptic training, the patient can be considered as having the blindspot syndrome and can be treated accordingly, that is, by full correction of the deviation and, if necessary, orthoptic training to establish an adequate amplitude of fusional movements.

Patients with anomalous correspondence constitute another major group who utilize the blindspot mechanism. Most commonly they are patients who have had large deviations partially corrected by surgery. The change in the deviation seems to disrupt suppression. Then the blindspot assumes the primary role of alleviating double vision. A new and harmonious angle of anomaly commonly develops. Hallden[7] also has noted the blindspot mechanism to be utilized in a patient with harmonious anomalous correspondence. This patient had had a recession and advancement two years prior to Hallden's examination.

It is contemporary opinion,[8] that anomalous correspondence is a sensory adaptation to a motor defect, that is, to the deviation. Study of some of these patients with the blindspot mechanism and harmonious anomalous correspondence provided some clues as to the purpose which anomalous correspondence serves in esotropia.

First, these patients, unlike those with the blindspot syndrome, do not describe confusion of images. This is so because, in the blindspot mechanism with anomalous correspondence, there is no functional area in the deviating eye with the same directional correspondence as the fovea. The fovea of the deviating eye has a different directional value than the fovea of the fixating eye (fig. 10).

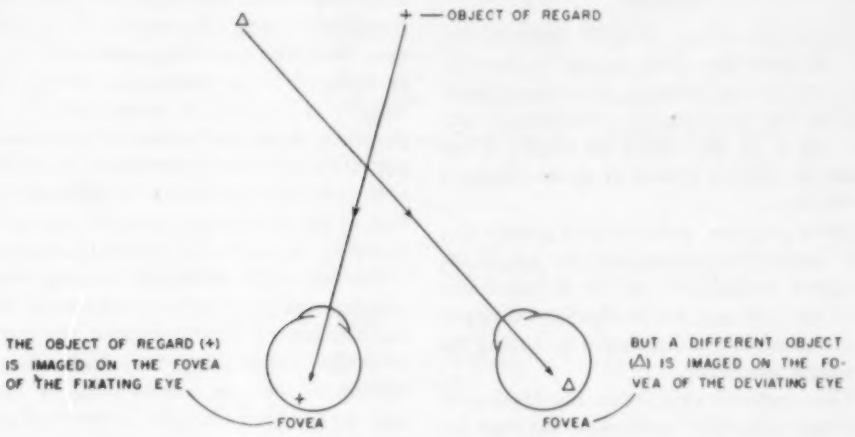
I have evidence that anomalous correspondence may serve another function. I have been able to demonstrate false projection in the peripheral field of vision in some patients with heterotropia and normal correspondence but these findings have been lacking in 11 older children and adults with anomalous correspondence and the blindspot mechanisms. Details of these studies will be reported in a later publication.

Patients with the blindspot mechanism and harmonious anomalous correspondence have made a high degree of sensory adaptation to their motor anomaly. They are asymptomatic and have a good substitute for normal binocular vision. They do lack fine stereopsis because in the central field vision is monocular but their only major handicap is a cosmetic one, that is, the appearance of esotropia. If a large angle kappa is present, even this defect may not be conspicuous.

These facts should be considered before treatment of these cases is undertaken because the prognosis for the establishment of normal binocular vision seems poor even when the surgical correction of the deviation has been combined with prolonged occlusion and orthoptic training.

In a group of 16 patients observed from 1945 to 1952, stable binocular single vision of the normal type has been developed in only one of 11 who were operated. Even the cosmetic results have been disappointing as compared to the improvement gained in other types of esotropia.

In only five patients was the deviation reduced to a few degrees of esotropia, but normal correspondence and binocular single vision were established in only the one child. In the other four a small angle of anomaly developed. In three other operated patients a temporary reduction of the deviation was obtained by surgery (unilateral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+ — OBJECT OF REGARD
THE OBJECT OF REGARD (+) IS IMAGED ON THE FOVEA OF THE FIXATING EYE
BUT A DIFFERENT OBJECT (△) IS IMAGED ON THE FOVEA OF THE DEVIATING EYE
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THE FOVEAS HAVE ACQUIRED ANOMALOUS DIRECTIONAL VALUES IN ACCORDANCE WITH THE DEVIATION; THEREFORE, THE TWO OBJECTS (+ AND △) APPEAR IN THEIR TRUE RELATIVE POSITIONS IN SPACE IN SPITE OF THE ESOTROPIA

Fig. 10 (Swan). Harmonious anomalous correspondence, right esotropia.

medial rectus recession) which ordinarily might have been expected largely to correct the deviation. More drastic surgery (bilateral medial rectus recession or recession-resection) had no effect on the deviation in one child but led to the later development of exotropia in two others.

Five patients have been untreated other than for the prescription of lenses, or attempts to disrupt anomalous correspondence by occlusion and orthoptic training. Over a period of five years, the deviation and the binocular status have remained unchanged in this group.

Despite the rather dismal results from my treatment of patients with the blindspot mechanism and anomalous correspondence, I believe that an attempt to establish normal binocular vision should be made in children. Monocular occlusion, orthoptic training, and surgery are indicated. If an appreciable improvement in alignment is not obtained from what seems to be an adequate surgical procedure and correspondence remains anomalous, further operations should be deferred.

On the other hand, if elimination of the deviation by surgery disrupts the anomalous correspondence and the patient shows potentialities for normal fusion, intensive orthoptic training should be undertaken. The blindspot mechanism with anomalous correspondence in asymptomatic adults should be left untreated until more effective methods are developed.

I have not described all the circumstances under which the blindspot mechanism develops nor all the conditions under which it is utilized. Much remains to be learned about the mechanism, particularly its relationship to suppression. Earlier I mentioned that there is a fourth group of patients with esotropia in whom the blindspot is in the center of a large area of suppression. This group which includes patients with the combination of amblyopia and eccentric fixation will be discussed in a later publication. In this presentation, it has been my major purpose to redefine the blindspot syndrome and to describe the two groups of patients with sensory anomalies other than suppression who utilize the blindspot mechanism.

Summary

In an estropia of 12 to 18 degrees, rays of light from the object fixated by the nondeviating eye fall upon the physiologic blindspot of the deviating eye; therefore, a second image of the object of regard is not observed. This is spoken of as the blindspot mechanism.

There are some patients with good vision and normal correspondence in whom the blindspot mechanism can be demonstrated to be the sole one which alleviates diplopia. These patients are designated as having the blindspot syndrome.

This syndrome most commonly develops in esotropia associated with neglected high hypermetropia or anisometropia, or after partial surgical correction of an esotropia of large magnitude. Also it may develop in esotropia of paretic origin.

Patients with the blindspot syndrome are relatively asymptomatic but may notice occasional diplopia and confusion of images. In addition to a persistent esotropia of 12 to 18 degrees, they may have a vertical deviation up to five or six degrees. Good fusional potentialities can be demonstrated on haploscopic devices.

The prognosis for the establishment of normal binocular single vision is excellent but the deviation must be eliminated; otherwise, recurrence of the syndrome is common. Generally, surgery is required. In many patients, orthoptic training is essential postoperatively to establish an adequate amplitude of fusional movements and a proper relationship between accommodation and convergence.

Patients with amblyopia may utilize the blindspot mechanism because amblyopia plays no role in the relief of diplopia. It does seem to relieve patients of the symptoms of image confusion. Amblyopia should be eliminated before surgical correction of the deviation, otherwise, good alignment may not be maintained. If the amblyopia persists, and surgery is undertaken purely for cosmetic purposes, it should be directed toward only partial reduction of the deviation. In children with persistent amblyopia, complete elimination of the deviation by surgery may be followed by the later development of exotropia.

Patients with anomalous correspondence also may use the blindspot mechanism. These patients have a good substitute for normal binocular vision. They have binocular perception in their peripheral fields of vision and do not have diplopia, image confusion, or peripheral false projection.

The prognosis for the establishment of normal binocular vision seems poor with present methods.

Surgery is not contraindicated but the cosmetic results were satisfactory in only five out of 11 patients. Normal binocular vision was established in only one patient. Procedures which usually effect an appreciable reduction in the deviation may produce little permanent change in the deviation, and more drastic surgery may lead to exotropia. For these reasons, if the deviation is not conspicuous, adult patients with anomalous correspondence who utilize the blindspot mechanism should be left unoperated.

3181 West Marquam Hill Road.

I wish to make two acknowledgments and to thank the Chicago Ophthalmological Society for inviting me to present this lecture in memory of Dr. Sanford R. Gifford.

Dr. Hendrie Grant of St. Paul called my attention to the writings of Wells and Adams and permitted me to study volumes from his library which otherwise would not have been available. Also, I am indebted to my colleagues of the Pacific Northwest who, knowing of my interest in the blindspot mechanism, have made patients available to me for study.

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MERIDIONAL LAMELLAR SCLERAL RESECTION*

In separation of the retina†

Raymond Emory Meek, M.D.
New York

Scleral resection was first described and performed by Mueller[1] in 1903 and later by Lindner,[2] Kronfeld,[3] and others. It has had enough success to warrant its being considered a rational procedure in the treatment of separation of the retina.

Paufique[4] contributed greatly to the popularity of scleral resection by limiting the resection to the outer layers of the sclera, making for a neater, less dangerous, and highly satisfactory procedure.

These techniques have all depended on a longitudinal incision parallel to the limbus just behind the insertions of the recti muscles or placed over the location of the tear. This operation satisfactorily shortens the arc of sclera from before backward allowing the shrunken retina a smaller bed on which to lie.

But what happens to the side-to-side pull?

It seems logical that the retina is on the stretch from side-to-side. While the antero-posterior sclera is foreshortened it is easy to visualize the retina now in folds—stretching from side to side.

To relieve this pull I have devised a meridional lamellar scleral resection to shorten the side-to-side arc and relieve the tension on the retina in this direction.

In placing a curtain on a curtain stretcher (consisting of four boards bolted together at each corner and the curtain stretched over pins), if one end piece with curtain attached is released (with the lateral boards held in position by some other means) the curtain, no longer on the stretch from end to end, is pulled in folds by a certain amount of elasticity, although it is still stretched from side to side.

The purpose of the additional procedure in scleral research reported herein is to release the side-to-side pull on the retina which would resemble the side-to-side stretch on the curtain.

Procedure

The amount of sclera to be resected is first outlined with a Lundsgaard or Paufique knife, as in the classical lamellar scleral resection. At the center of this ellipse, and perpendicular to it, another incision is made back as far as practical—care being taken not to go as far as the venae vorticosae or

* From the Research Department of the New York Eye and Ear Infirmary.

† Eight operations have been performed, using meridional lamellar scleral resection. Six of these have been successful, one improved, and one a failure. Of the six successful cases, one was a separation of seven months' duration and the other of over a year. The case which was improved was the third operation in an eye with an old separation. One of the successful cases again became detached one month after leaving the hospital.

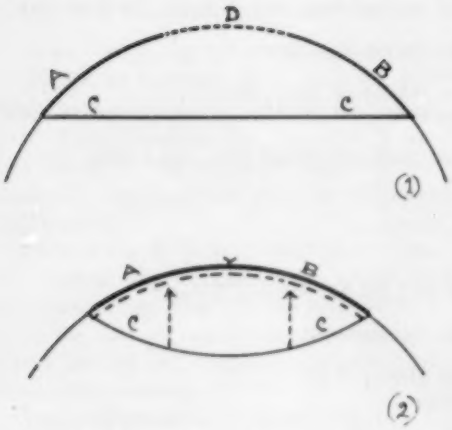


Fig. 1 (Meek). This sketch illustrates how the stretch of the retina from side to side is released by shortening the surface arc of the sclera. In (1) A-D-B is longer than C-C. D is the area of sclera to be removed by infolding (after the outer layers are removed). In drawing (2) D has been removed and A-B and C-C are now about equal and the dotted line in C-C can be approximated to A-B.

the short posterior ciliary arteries around the optic nerve and to avoid the macula.

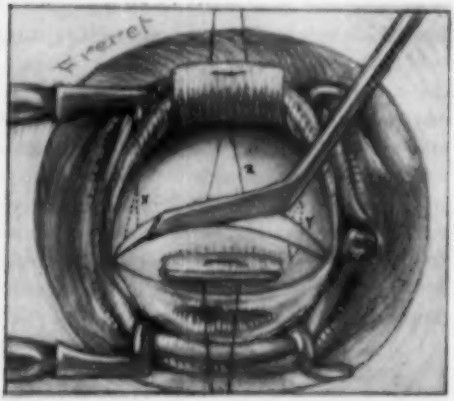


Fig. 2 (Meek). The side-to-side incisions are made with a Lundsgaard knife. From a point behind the side-to-side incisions two diverging cuts (Z), starting at a point determined by the location of the tear, meet the side-to-side incision at right angles. (X) is the location of a meridional section which may be made at the end or (Y) a section which is partially behind and partially in front of the section parallel to the limbus).

Beginning at the end of this incision another incision is made, starting at the end of the first but diverging from it so that

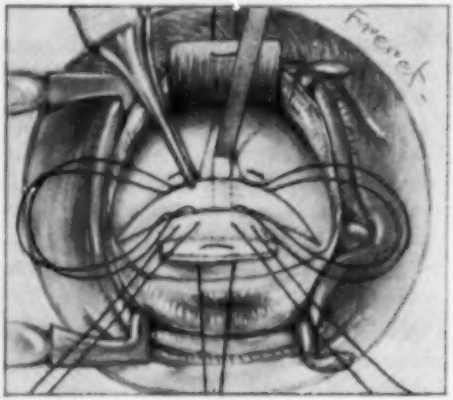


Fig. 3 (Meek). The outer two thirds of the scleral coat is raised by a Paufique knife. Mattress sutures or single sutures are placed in the edges of the sclera.

when it meets the longitudinal incison the two diverging lines will be about three to four-mm. apart.

A Paufique knife is now used to separate

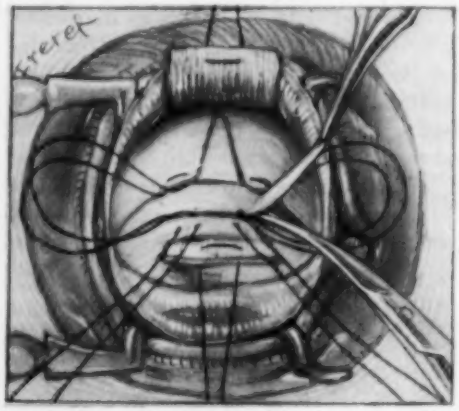


Fig. 4 (Meek). The side-to-side strip is removed.

and remove the outer two-thirds of the sclera, similar to the manner in which the ellipse is removed in the Paufique procedure. The

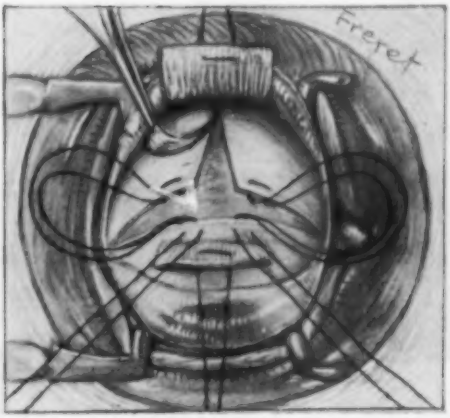


Fig. 5 (Meek). A strip of sclera is removed from the meridional area in a similar manner.

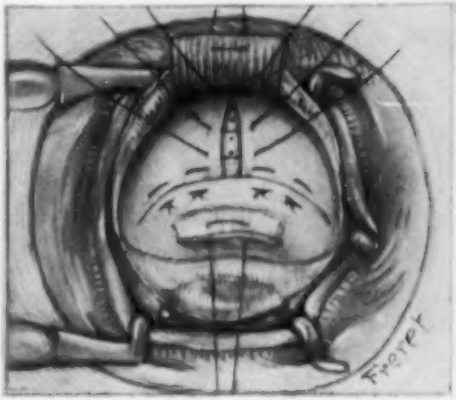
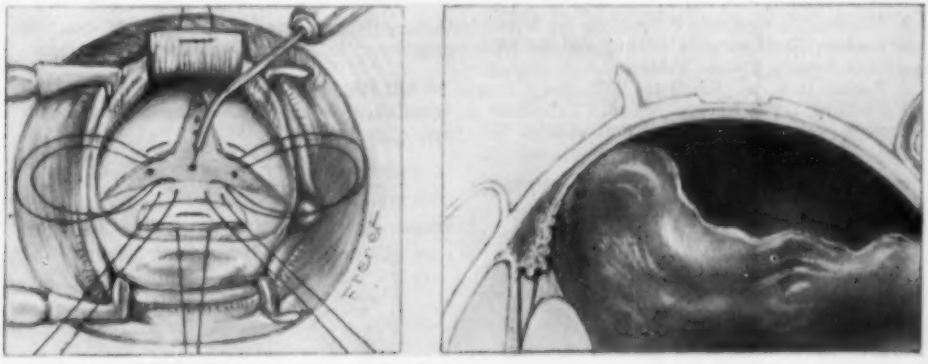


Fig. 7 (Meek). The meridional portion is treated in a similar manner with diathermy after the sutures have been inserted. It is well to insert the sutures before the eye is softened by punctures.

wound is sutured together with 5-0 white silk.

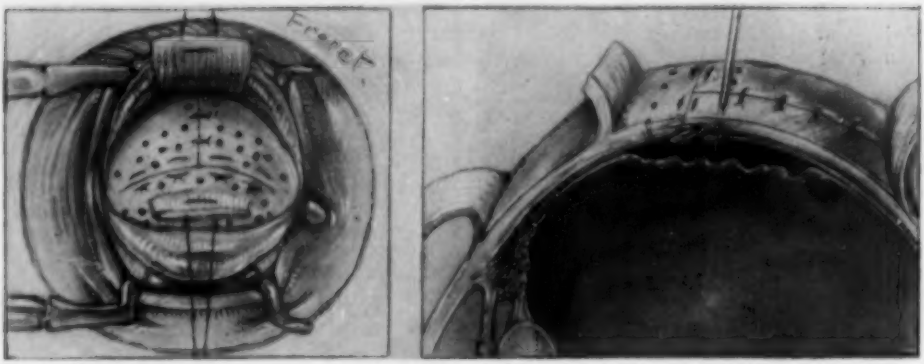
This meridional lamellar resection does not necessarily have to be placed at the center of the longitudinal section, it may be placed at either end or any point in its course as to avoid the venae vorticosae. If the longitudinal resection has been placed far back on the eye, the meridional resection may be placed in front of or half behind and half in front. An attempt is made to place the meridional resection over the hole or tear in the retina.

When the situation of choice is near the equator of the eye the meridional resection may be anterior to the side-to-side incision. A meridional resection too far forward however is not advised because of the high astigmatism and hemorrhage that might



A B

Fig. 6 (Meek). (A) Before any attempt is made to tie the sutures the inner lamella of the sclera and the choroid are punctured with a small needle and diathermy to allow the subretinal fluid to drain off. This will permit the wound edges to come into apposition. (B) This shows the outer layers of the sclera with the transverse section removed to give a foreshortened sclera on which the shrunken retina may lie.



A B

Fig. 8 (Meek). (A) The sutures are now all tied. Surface diathermy is applied on either side along the suture lines. The arc of sclera is now shortened by the infolding of the inner third of the sclera together with the choroid. The side-to-side stretch as well as the front-to-back stretch of the retina is released. The retina now easily comes to rest on the choroidal bed. (B) This shows the tension on the retina released both from before backward and from side to side to allow the retina to lie comfortably on the smaller bed.

result. The anterior incision parallel to the limbus as described by Pischel and Kronfeld[3] may be placed nine to 13 mm. from the limbus but they state 13 mm. is usually the posterior limit. A small meridional lamellar resection may be made in front of and another behind the longitudinal resection.

It is felt that this added release of tension on the retina will lead to a great increase in cures of separation or so-called detachment of the retina. If a scleral resection is to be done, it is logical that the sclera must of necessity be shortened from side to side as well as from before backward.

729 Park Avenue (21).

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ACUTE OPHTHALMOPLEGIA*

A DIFFERENTIAL DIAGNOSIS

IRA A. ABRAHAMSON, JR., M.D.
Cincinnati, Ohio
AND
IRVING D. HORWITZ, M.D.
Beverly Hills, California

INTRODUCTION

Due to the serious implications of an acute onset of internal and external ophthalmoplegia, as indicated by cases observed in this clinic, it was considered sufficiently important to present as a separate subject in the ophthalmic literature. Unlike the previous numerous reports in the literature of orbital —apex and sphenoidal—fissure syndromes, we are not confining this paper to a presentation of a clinical syndrome but rather to a differential diagnosis of this acute problem.

It is the purpose of this paper to increase the awareness of the oculist to this diagnostic problem by a comprehensive correlation of anatomic and clinical findings illustrated by case presentations.

CLINICAL PICTURE

A. SYMPTOMS

The patient presents himself with a history of sudden ptosis either preceded or followed by hemicrania or orbital pain. The nature of the hemicrania is vague—being either severe or mild but always of a steady neuralgic type with radiation from the frontal to the occipital region. The orbital pain, if present, is described as a "pressure sensation." If trauma is definitely established as an etiologic factor, the pain is usually confined to the orbital region.

B. SIGNS

The ocular findings are quite dramatic. There is usually a complete ptosis and loss or marked limitation of ocular motility indicating involvement of the third, fourth, or sixth cranial nerves—external ophthalmoplegia.

Depending on the etiology of the syndrome, proptosis may or may not be present. If it is observed in the acute stage it is very slight, but continued follow-up of the case may reveal progression of this finding.

Further ocular inspection reveals a dilated fixed pupil to both direct and consensual light stimulation of that eye. There is an accompanied loss of accommodation as evidenced by the discrepancy between distance and near vision in which the near vision can only be made to approximate the equivalent distance acuity by the addition of a +3.0D. sph. lens. These findings indicate internal ophthalmoplegia.

Detection of sensory disturbances (sometimes absent) may occur in the very early stages by a hyperesthesia of the cornea as well as the other areas served by the ophthalmic division of the fifth cranial nerve. As the process continues, one may find the development of diminishing sensibility of the cornea, upper lids, nasal, and supraorbital regions.

Involvement of the optic nerve should be looked for in all cases in which internal and external ophthalmoplegia are present. An invaluable aid is a careful plotting of the visual fields. The presence of scotomas is not inconsistent with this affection.

CASE PRESENTATIONS

CASE 1

T. R., a 49-year-old Negro, presented with a left ptosis of three days' duration, with a history of being struck with a hammer over the left eye four

* From the Department of Ophthalmology, Cook County Hospital, Chicago. Presented before the Chicago Ophthalmological Society, November 16, 1953.

Fig. 1 (Abrahamson and Horwitz). *Case 1.* X-ray films of the left orbit revealed a fracture through the inferior margin in the medial region.

days previously. On arising the following morning he was unable to open this eye.

Examination revealed no neurologic findings. Vision was: R.E., 20/20; L.E., 20/40, correctible with a: +1.0D. cyl. ax. 25°, to 20/20.

There was complete ptosis of the left upper lid and complete paresis of all extraocular muscles of the left eye except for the lateral rectus muscle which retained slight function. A slight proptosis was noted. Diffuse subconjunctival hemorrhage was present.

There was a definite corneal hypesthesia in the left eye. The pupil was dilated to seven mm. and fixed, showing no response to direct or consensual light stimulation or accommodation. Accommodative loss was substantiated by the necessity of adding a plus 3.0D. sph. lens in order to make near vision comparable to the distance vision.

Although the instillation of 0.5-percent eserine elicited no response, the pupil constricted to four mm. following the application of two-percent pilocarpine. During the period of pupillary constriction with pilocarpine, the accommodation improved, necessitating only a plus 1.0D. sph. lens for near vision.

The media and fundi were normal. X-ray films of the left orbit (Water's view) revealed a fracture through the inferior margin in the medial region (fig. 1).

Clinical impression. Traumatic retrobulbar hemorrhage secondary to fracture.

Course. The patient was managed conservatively, receiving ice packs to the left eye. He demonstrated a gradual progressive improvement. Four weeks later, the ptosis was no longer present, proptosis was not evident, extraocular movements showed only slight limitation, and corneal sensitivity returned to normal. Pupillary responses and accommodation were markedly improved.

CASE 2

E. B., a 43-year-old Negress, presented with a left ptosis of one day's duration. The ptosis was found to be present on awakening in the morning and was preceded by a hemicrania and retrobulbar pain of five days' duration. Following the onset of the ptosis, the hemicrania subsided. The past history was essentially negative.

Examination revealed: Blood pressure, 120/80 mm. Hg. Uncorrected vision was: R.E., 20/20; L.E., 20/100 which could not be improved. With a +3.0D. sph. lens, the near vision (L.E.) was made to approximate the distance vision.

There was a complete oculomotor paralysis which was manifested by ptosis, limited motility, and complete internal ophthalmoplegia. This was confirmed by loss of pupillary reactions and absence of accommodation. It was noted that some abduction was present indicating minimal involvement of the abducens nerve.

Left corneal sensitivity was thought to be impaired. Funduscopic examination was negative. Visual fields revealed a small central scotoma in the left eye.

Laboratory findings. Serology, negative; angiography revealed an aneurysm of the left internal carotid artery just beyond the genu (fig. 2).

Fig. 2 (Abrahamson and Horwitz). *Case 2.* Angiography revealed an aneurysm of the left internal carotid artery just beyond the genu.

Clinical impression. Supraclinoid aneurysm of the left internal carotid artery.

Course. Following angiography, the patient made an uneventful recovery without complications and later a surgical ligation of the left internal carotid artery was successfully performed and the patient continued to show a gradual ocular improvement.

CASE 3

V. J., a 32-year-old Negress, was seen as a referral from the medical service because of ptosis of the right eye of one day's duration. There was a history of severe right hemicrania associated with retrobulbar pain radiating to the occiput for five days prior to the onset of ptosis. The ptosis was discovered when the pain was gone.

Past history revealed a hypertensive cardiovascular disease of five years' duration, during which time the blood pressure varied between 140/80 and 210/110 mm. Hg.

Examination. Blood pressure, 140/80 mm. Hg. Vision: R.E., 20/30, correctible to 20/20; L.E., 20/50 correctible to 20/30.

There was a complete oculomotor paralysis with partial trochlear and abducens involvement. Proptosis was absent.

There appeared to be a hyperesthesia of the right cornea. Both corneas showed evidence of an old healed interstitial keratitis.

The right pupil was dilated and fixed to light and accommodation. An internal ophthalmoplegia was substantiated by a complete absence of accommodation which could be compensated for by the addition of a +3.0D. sph. lens.

Funduscopic examination revealed a grade-II hypertensive retinopathy. Peripheral visual fields were within normal limits. The central fields, however, could not be obtained because of poor cooperation.

Clinical impression. Aneurysm of right internal carotid artery or circle of Willis.

Course. An emergency neurosurgical consultation was immediately advised. The medical regime consisted of sedation. The following morning the patient was found comatose. Lumbar puncture revealed gross blood in the spinal fluid with an initial pressure of 550 mm. H_2O. The patient continued this downhill course and died two hours later. Unfortunately, the family did not consent to a postmortem examination. Considering the blood pressure and the finding of gross blood in the spinal fluid, it seemed evident that a subarachnoid hemorrhage was present.

CASE 4

M. S., a 46-year-old Negress, was seen in the clinic with a history of severe right hemicrania of nine days' duration, not relieved by aspirin. Two days before coming to the clinic (nine days following onset of the headache) she awakened in the morning and found she was unable to raise her right upper lid. Following the onset of the ptosis the hemicrania markedly subsided and the patient was relatively comfortable.

Fig. 3 (Abrahamson and Horwitz). *Case 5.* There was complete ptosis and immobility of the globe.

Examination. Except for the ocular and blood-pressure findings, the general and neurologic examinations were not remarkable. Blood pressure was 190/110 mm. Hg. Vision was: R.E., 20/70, correctible to 20/50 with a +1.50D. sph.; L.E., 20/25.

There was a complete ptosis of the right upper lid and paresis of the right extraocular muscles innervated by the third cranial nerve. The right superior oblique and lateral rectus showed only slight limitation of their actions, indicating but a partial involvement of the right fourth and sixth cranial nerves. No proptosis was present.

The corneal reflex was not impaired and was equal in each eye. The right pupil was dilated and fixed yielding no response to direct or consensual light stimulation or accommodation. Only with a +3.0D. sph. lens could the near vision be approximated to the distance vision, indicating an internal ophthalmoplegia. The remainder of the ocular examination was normal.

Clinical impression. Supraclinoid aneurysm of right internal carotid artery.

Course. The patient was hospitalized, receiving bedrest and conservative management. Angiography was discussed with the patient but refused by her. Following an uneventful course, the patient was discharged after several weeks. During the succeeding months, follow-up examination revealed

remission of the ptosis with a partial return of ocular motility.

CASE 5

M. T., a 60-year-old white woman, presented with a history of awakening in the morning one week before with a severe right hemicrania and ocular pain. On arising the patient noticed ptosis of the right upper lid. She had been a known hypertensive for the preceding five years, receiving medical therapy. There was no history of diabetes or syphilis. Because of the persistent pain which was not relieved by the common analgesics, she became frightened and decided to seek consultation.

Examination. The patient was a very obese woman with evidence of peripheral vascular disease, emphasized by the presence of leg ulcers. Blood pressure was 240/130 mm. Hg. Except for the ocular findings the neurologic examination was essentially negative. Vision was: R.E., 20/200; correctible to 20/70; L.E., 20/200, correctible to 20/20; prescription, +1.25D. sph.

There was a complete ptosis and total immobility of the globe (fig. 3) indicating severe involvement of the third, fourth, and sixth cranial nerves —external ophthalmoplegia. Minimal proptosis was present.

The right corneal reflex was hyperactive with a painful hyperesthesia over the right nasal region, upper lid, and frontal area. The right pupil was dilated and fixed, eliciting no response to direct or consensual light stimulation.

A +3.0D. sph. lens was required for the right eye to approximate the near with distance vision at the normal reading distance. This was indicative of an internal ophthalmoplegia. Funduscopic examination revealed slight temporal pallor of the right optic disc.

Clinical impression. Infraclinoid aneurysm of the right internal carotid artery.

Course. The patient was immediately hospitalized on the neurosurgical service, receiving conservative medical management. In view of the patient's age, general condition, and hypertension, angiography and ligation of the internal carotid artery were considered contraindicated. Follow-up observation revealed progressive loss of sensitivity over the course of the ophthalmic division of the right trigeminal nerve. At present the patient is still under close observation for any possible change in her condition. Management is still conservative.*

DISCUSSION

Since this paper is concerned only with the acute infranuclear problem of internal and external ophthalmoplegia, we take the liberty of omitting the enumeration and discussion of the nuclear causes capable of producing a similar clinical picture. For a comprehensive presentation of these latter subjects one may refer to Duke-Elder's[1] classification.

Furthermore, a discussion of those entities responsible for an insidious onset of these conditions, for example, tuberculosis, syphilis, sarcoidosis, neoplasm (primary or metastatic), chronic sinusitis, and so forth, are likewise not within the confines of this dissertation. These entities are ably discussed by Kjaer,[2] Von Horanyi-Hechst and Szatmari,[3] Simonelli,[4] Holt and deRoetth,[5] Tassman,[6] Rochon-Duvigneaud,[7] Dejeans,[8] Finlay,[9] and Hunter.[10]

We would like to emphasize those infranuclear conditions, capable of producing an acute onset of internal and external ophthalmoplegia, which the practicing ophthalmologist most frequently considers in the differential diagnosis of this serious affection:

1. Aneurysm of internal carotid artery or circle of Willis
2. Trauma
   a. Orbital facture
   b. Orbital hematoma
3. Orbital cellulitis secondary to acute paranasal sinusitis
4. Ophthalmoplegic migraine
5. Myasthenia gravis

1. ANEURYSM

This vascular lesion, prognostically speaking, is probably the most serious etiologic factor in acute internal and external ophthalmoplegia of infranuclear origin. With this in mind, it behooves the ophthalmologist to consider a presumptive diagnosis of this condition until it can be ruled out with some certainty.

According to Dandy[11] and Jefferson,[12] a defective arterial wall predisposes the aneurysm to rupture. Because of this possibility, the graveness of this condition demands an immediate neurosurgical consultation. Unless the ophthalmologist is aware of this im-

* Case 5 was last seen on August 21, 1954, with minimal ptosis. The abducens nerve was still paralyzed but the oculomotor nerve was recovering nicely. Accommodation had returned to normal.

portant entity, the neurosurgeon will not be consulted and the patient's life may be in peril. Case 3 indicated the rapidity with which a fatal termination may occur.

Although the diagnosis, according to Duke-Elder,[13] may present great and perplexing difficulties, once the clinical picture begins to develop, it follows a characteristic pattern as described earlier in this paper.

If the aneurysm, in its expandible phase, is large enough, it may simulate an intracranial space-consuming lesion. Because of its proximity to the neurologic structures traversing the cavernous sinus, it will impinge upon them. This early compressive phase may be marked by a variant of the paratrigeminal syndrome, indicating an irritative phenomenon.

Clinically it may manifest itself as hyperesthesia of those structures innervated by branches of the trigeminal nerve (with special reference to the branches of the ophthalmic division), illustrated in Cases 3 and 5. Continued compression will result in diminished sensory function (Case 5). The nature of the ophthalmoplegia will, of course, depend upon the extent of the compression by the aneurysm. In this location the aneurysm is referred to as subclinoid.

When the aneurysm is located in the internal carotid artery, after piercing the dura above the cavernous sinus, it is considered supraclinoid. With this latter type of lesion, an isolated oculomotor nerve palsy associated with visual disturbances is frequently seen. This was the picture found in Cases 2 and 4.

An aneurysm may follow one or two courses:

a. *It may cease to expand,* following which thrombosis will occur. In this state the aneurysm does not serve as a threat to life. The ophthalmoplegia may improve, but some sequela will always remain. This is illustrated in Case 4.

b. *Rupture.* If present in the cavernous sinus, an arteriovenous fistula will occur with resulting pulsating exophthalmos. An audible bruit is not always present. A supraclinoid aneurysm may also have a small leak or a large rupture. Because of its communication with the subarachnoid space, a lumbar puncture may reveal blood in the spinal fluid, the degree of which depends upon the extent of the rupture. Regardless of its location, a leaking or ruptured aneurysm offers, at best, only a grave prognosis. In Case 3, a grossly bloody spinal fluid was found a short time before death.

Although angiography is an invaluable aid in establishing the diagnosis, one must be cognizant of the fact that it is a potentially dangerous procedure. Jefferson and Dandy have advised extreme caution in selecting the appropriate case to undergo this procedure.

Case 2 was considered a good risk and angiography was instrumental in revealing a supraclinoid aneurysm. In Case 5, the presence of hypertension and poor general physical condition served as a valid contraindication to angiography. Because of the rapid course of events in Case 3, neurosurgical consultation was barely finished when the patient died.

2. Trauma

The clinical picture previously described of acute internal and external ophthalmoplegia may be a sequel of trauma to the orbit. An injury sufficiently great to produce these findings usually results from a fracture near the orbital fissure or a massive retrobulbar hemorrhage producing considerable pressure on the nervous structures emerging from this fissure. Several cases in which trauma was the etiologic factor were reported by Badal and Fromaget[14] in 1894.

In Case 1 of our group, an orbital fracture was demonstrated following a traumatic history with the onset of symptoms occurring one day after the injury.

Terrien[15] reported a similar cause of trauma, namely, a hammer blow to the arcus superciliaris. Apparently no fracture was demonstrated by him and it was felt that an

orbital hematoma was responsible for the clinical picture.

A traumatic history certainly furnishes a most important clue for the diagnosis, excluding the necessity for an extensive work-up.

3. Orbital cellulitis

There have been many reports in the literature of internal and external ophthalmoplegia resulting from orbital cellulitis. The majority of these cases were considered to be an orbital extension of a sinusitis. These cases have been reported as the apex and superior orbital fissure syndromes, respectively.

The superior orbital fissure syndrome presents a picture such as we have described. It is noteworthy that visual disturbances are not present. If the optic nerve becomes involved, the syndrome is referred to as the orbital apex syndrome. These syndromes, as presented in the literature, are usually of insidious onset; it should be mentioned, however, that an acute onset is possible though uncommon.

Holt and deRoetth reported three cases in which they felt there was an infectious etiology. Kjaer presented a case in which pansinusitis was the cause.

These patients are usually toxic and present the characteristic findings of a severe infectious process.

Ophthalmoscopic findings may vary from mild papilledema to severe optic neuroretinitis. It is interesting that one of the earliest ophthalmoscopic findings is an ipsilateral loss of the venous pulsation—later followed by dilatation of the retinal veins, indicating some degree of venous stasis.

Although relatively rare, tenonitis (serous or purulent) may be mentioned since it can result from systemic disease, such as rheumatic fever, gonorrhea, or acute febrile illnesses. Clinically, there is a tendency for bilateral involvement a few days after the sudden onset and relapses are common. According to Duke-Elder, the three essential signs of serous tenonitis are proptosis, limitation of ocular movements, and serous chemosis associated with palpebral edema. The purulent form is similar but has a more violent clinical picture. When suppuration occurs, there will be a pointing of the pus through the conjunctiva near the insertion of a rectus tendon, frequently the medial. The prognosis of this entity is at all times guarded.

4. Ophthalmoplegic migraine

Although this syndrome is of the group of recurrent ophthalmoplegias, it should be mentioned because it must be differentiated from an intracranial aneurysm. For a comprehensive exposition of this subject we refer to Harrington and Flocks'[16] recent presentation. As pointed out by these authors, an obvious migraine syndrome, usually present for many years, later is associated with recurrent oculomotor paralysis without residual paralysis between attacks. Diplopia, which is indicative of some involvement of the oculomotor nerve, is usually the chief ophthalmic complaint.

As the condition progresses, with recurrent attacks, the initial transient symptoms and signs may become irreversible—the ophthalmoplegia becoming permanent and scintillating scotoma developing into a hemianopsia. Internal ophthalmoplegia, although not characteristic, may be present in the early stages and found to be reversible. Once the external ophthalmoplegia becomes irreversible it may be accompanied by an internal ophthalmoplegia as well.

Although this syndrome is now being considered a definite clinical entity, nevertheless, one must exercise caution in establishing the diagnosis without carefully excluding an organic lesion, the most important being an intracranial aneurysm.

5. Myasthenia gravis

This condition, although not accompanied by an internal ophthalmoplegia, is capable of producing a fairly acute external ophthal-

moplegia of varying degree. It is usually recurrent and easily diagnosed, once it is considered. We have considered this entity because, in any case of acute external ophthalmoplegia, myasthenia gravis should be ruled out.

Summary

1. Acute internal and external ophthalmoplegias have been considered sufficiently important to record as a separate subject in the ophthalmic literature.

2. A characteristic clinical picture is presented and illustrated by case reports.

3. An attempt has been made to correlate anatomic and clinical findings.

4. A differential diagnosis and review of the literature are presented.

808 North Crescent Avenue.

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SENILE ECTROPION

Analysis of types and surgical correction

Alston Callahan, M.D.
Birmingham, Alabama

Senile ectropion has been known since ancient times and its frequency is increasing, as are all geriatric problems (fig. 1). It is due to senescent changes in the tissues of the lower lid and, depending upon the predominating characteristic, it may be the relaxed, the cicatricial, or the spastic variety. Senile ectropion is usually thought of as the relaxed type and, though this is the most common type, the other two types must be clearly differentiated because the surgical repair is entirely different for each.

Relaxed or atonic type

When atrophic changes have thinned out the skin and muscle so that the lid is lax, and hangs forward and downward, successful repair can be accomplished by shortening and strengthening both laminae with the Kuhnt-Szymanowski procedure.

Cicatricial type

When contraction of the skin and orbicularis has drawn the lid downward and shortened and thickened it, successful repair can

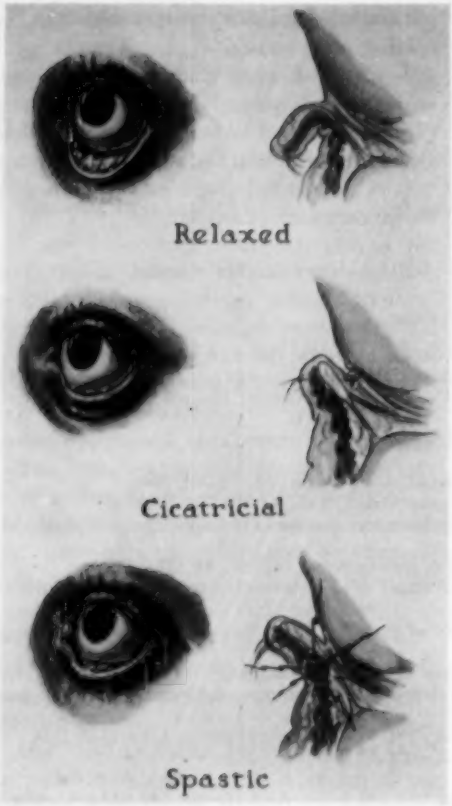


Fig. 1 (Callahan). Varieties of senile ectropion.

be achieved by removing the scar tissue, adding skin by free grafts or pedicle flaps, preventing contraction by intermarginal lid adhesions, and elevating and supporting the lid.

My procedure of choice for this is the transfer of a wide double-pedicled flap of the skin and subcutaneous tissues from the upper lid to the lower, described by Stallard as a bridge pedicle flap. If an area of conjunctiva has become irreversibly keratinized, it must be resected before the intermarginal lid adhesions are made.

Spastic type

If, while the senile relaxation of the skin and lid border is permitting the margin of

Fig. 2 (Callahan). Spastic senile ectropion. Relaxation of the lower lid has combined with spasm of the orbicularis band along the lower edge of the tarsus.

the lower lid to sag forward and downward, by coincidence spastic contraction of the orbicularis bands along the base of the lid occur, senile spastic ectropion is inevitable.

Successful repair can be accomplished by shortening the lid horizontally and excising part of the spastic orbicularis band; the sector of lid to be removed is that which contracts the most. Usually these two conditions are in the same part of the lid.

Fig. 3 (Callahan). Appearance six months after operation by the technique illustrated in Figure 4.

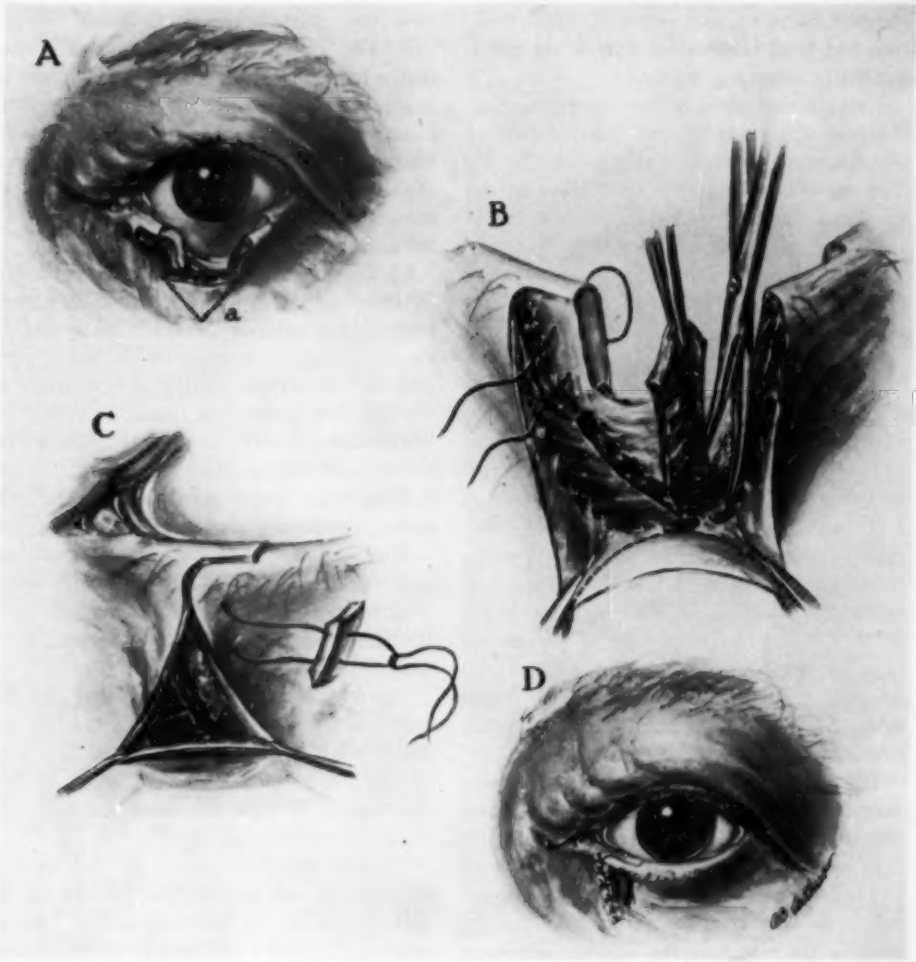


Fig. 4 (Callahan). Spastic senile ectropion repaired by shortening the lid horizontally at the point of greatest relaxation and excision of part of the spastic orbicularis band.

The relaxed and cicatricial forms of senile ectropion are usually bilateral but may be more advanced in one lid than in the other. Also, the sagging and downward contraction of the lid is usually greatest at the midpoint but may be more advanced in any sector of the lid. Senile spastic ectropion occurs less often than the other two types, and is usually unilateral.

The surgical technique of repair for the relaxed and cicatricial types is available in ophthalmic surgical texts but, as far as I know, senile spastic entropion has not been previously described as a separate entity, nor its method of correction illustrated.

A typical case is therefore shown.

Case report

A 63-year-old woman complained that her left lower lid hung down and frequently

jumped, twitched, and cramped. This condition had been present for five or six years, gradually becoming worse.

Examination showed that the greatest relaxation was medially, the mucosal surface being turned forward at this point (fig. 2). The sector of orbicularis at the lower border of the tarsus contracted spasmodically at frequent intervals, stimulated by blinking.

The appearance one year after operative repair, the details of which follow, is considered satisfactory (fig. 3).

Operative procedure

The standard procedure which I use in such cases is presented (fig. 4):

A. *Under local anesthesia* obtained with procaine-epinephrine, a complete sector is removed from the lid, the edges of the surgical coloboma being halved as in the Wheeler technique. The size of the sector to be removed is determined by inserting a skin hook in the lid margin on each side of the area of greatest sagging, and pulling these two points of the lid margin together. With aniline dye, the amount of lid that can be overlapped (or "pleated") is marked.

In this particular case, the sector was four-mm. long and was located in the nasal third of the lid. After this rectangular lid area had been removed, the orbicularis band at the base of the lid and below the surgical coloboma was seen to contract frequently, causing the edges of the surgical coloboma to flap backward and forward. The sector of skin was removed from the area outlined in the triangle (a) of Figure 4-A, bringing into view the spastic orbicularis bands.

B. *The enlarged scale illustration* shows that a triangular sector of the orbicularis is being removed further down than the skin triangle to be removed, so that the spastic band will be completely divided. To control the horizontal tension when the surgical coloboma is closed, a mattress suture has been inserted through the tarsus medially.

C. *The edges of the coloboma* are united by inserting the arms of the mattress suture through the anterior lamina. This is one of the most important steps of the entire procedure. The careful placing of this suture is the key to a successful result. It should be drawn up tightly to observe if the margins are meticulously matched.

Even experienced ophthalmic plastic surgeons frequently remove the ends of the suture brought through the anterior lamina, and then reinsert them at a higher or lower position. This is because from inspection at the time the sutures are first drawn up a more precise placement can be made.

No step should be hurried, this one the least of all. Only after verification of the result it will give should the suture be drawn snugly and tied over a rubber strip. A few interrupted sutures (chromic gut 4-0) are used to join the tarsal edges.

D. *The mattress suture* is tied over a rubber strip and several skin sutures are inserted to unite the skin edges. The sutures must not support the weight of the lid or correct the horizontal tension, or they will be pulled out.

903 South 21st Street.

ALBRECHT VON GRAEFE: THE MAN IN HIS TIME*

EGON V. ULLMAN, M.D.
Portland, Oregon

The achievements described in foregoing installments* were the great milestones of von Graefe's existence, but how did the "noiseless tenor of his way" go on? What sort of daily life did he lead?

In Graefe the scientist, teacher, physician, and man blended together to make a being of radiant harmony.

Adolph Weber of Darmstadt wrote: "One was spell-bound in his clinic, as if in a magic place. The multitude of new facts, viewpoints never heard before, the fascinating presentation and glowing enthusiasm acted like a revelation."

Dr. A. Samelson, of Manchester, who stayed at the Karlstrasse Clinic for a period of four months toward the end of its director's life, has left us some interesting reminiscences about the order of the day there and how things were carried on.

"... He never delegates any of his duties," wrote the Englishman, "excepting the merest routine—not disdaining to do himself thousands of times over that which lesser minds would scorn as derogatory ... patients of both sexes are seen from every quarter of the globe and of all classes of society. From the Eye-Clinique can be seen the wooden bridge, the lumber yard just across the river Spree. ...

"The patients of the hospital proper are charged at the rate of one pound sterling, 17 shillings and six pence per month, for all in all. There are, however, about 15 beds for such patients as are unable to pay, entirely entertained at Professor von Graefe's own expense; and a considerable number of hospital patients, again, are admitted at half the usual charge. Many also are assisted with a free pass by the communal authorities of Berlin and of other towns, who undertake the liability for them. In the private sick-rooms, the charge per bed (there staying, in many instances, a relative, friend, or attendant, with the patient at the Clinique) varies from four to five shillings a day, according to the size of the room. ...

Fig. 6 (Ullman). Needling of a juvenile cataract. Graefe operating without anesthetic, 1853.

"For this payment, lodging, meals, and service are afforded; while fuel, lights, medicines, night-watches if required, errands, etc., are separately, and for the most part moderately, charged for.

"There is, of course, to be paid, besides, the fee for medical attendance, as given, first by the professor himself, and secondly by one of his three assistants, Drs. Waldau, Arendt,

* The first part of this article appears on pages 525-543 of the October, 1954, issue of THE JOURNAL.

The second part of this article appears on pages 695-711 of the November, 1954, issue of THE JOURNAL.

Fig. 7 (Ullman). The celebrated doctor. Graefe's waiting room. Probably 1857.

and Ewers, to the care of one or the other of whom each of these private patients is entrusted.

"The sick-rooms all over the establishment are regularly visited by von Graefe once a day; but every operation-day—i.e., three times a week—and frequently also on other days, he sees the operative cases and others requiring it again late at night. On many days, he pays three or even four visits at the establishment. In his visits to the private patients, he is not usually attended by any of his assistants, who have to report what is necessary at other times; but a male attendant follows him with a case containing the most usual applications; and the nurse to whose department the patient belongs has to be regularly and promptly at hand with her own medicine-case and dressing, or else with those set apart for the individual patient.

"The private patients are often, whilst at the Clinique, attended to for their general bodily ailments or some special affection by their regular doctors, or by some practitioner called in at their own desire or at von Graefe's suggestion. . . .

"The whole of the patients are tended by female nurses, who have each a housemaid attached, with whom they appear to work in pleasing harmony, one having often momentarily to act as the substitute of the other. There are as many small kitchens as there are couples of nurses' house-maids in the private portion of the establishment; five or six rooms being apparently the complement for each couple. The nurses, varying in age from about 16 to 60 (and of whom only a small number have for a long series of years been attached to the institution), have to serve an apprenticeship of several months, during which they receive no wages, under one or another of the older nurses, and are each and all free to leave or liable to be dismissed at less than a day's notice.

"Often individuals who have been patients of the Clinique before, stay or return to become nurses. There are now two young and very efficient ones, wearing each an artificial eye, in place of the one enucleated at the Clinique.

"The meal hours of the establishment are as follows: Breakfast at eight, dinner at two, coffee at four, and supper at seven o'clock. The house door is locked at 10:20 P.M. The meals generally—we are now speaking of the private portion of the establishment—are very carefully prepared and from good material, except the coffee, which is distinguished by its weakness. The dinner is as substantial as persons enjoying perfect health are accustomed to partake of abroad. The ordinary beverage is water, and this of tolerable quality. A glass of beer or a bottle of light wine may be ordered and had, but they are, on the whole, but little in request. An exception in diet from the rule is apparently but seldom thought necessary, and perhaps almost exclusively for persons who have had some trying operation recently performed upon them. . . .

"The dinner for those who are permitted

or choose to have it out of their rooms, is served in the dining-saloon, which accommodates about 40 persons. The attendance here is most efficient. The company of ladies and gentlemen, of course, greatly varying in age, comprising natives of every clime, often the many healthy companions of patients, and hardly ever persons very gravely affected, is frequently most interesting.

"At the Clinique, attendance is given by von Graefe, whilst he is at Berlin, every day, Sundays and holidays included. The patients begin to appear at 12 o'clock, and distribute themselves over the three anterooms, which in an irregular curve skirt the reception room which is the operating room and lecture room as well.

"When the time for operating has come, tables and chairs are moved out of the way, and the couch so long raised against the wall, a very convenient and little complicated structure, is lowered and properly placed. The applicants for relief are admitted indiscriminately, without any inquiry into their pecuniary circumstances. There being no outside contributors to this entirely private charity, anything like a recommendation is unknown.

"von Graefe appears himself at the Clinique at about two o'clock. He sees patients three or four days in the evening, too, by lamp-light, from seven o'clock often until midnight. Every patient has to sit down before him; and he occupies a higher chair with its back to the window.

"The out-patients are admitted in batches of from four to six by an attendant, who provides the new comers with a slip of paper containing their names, ages, occupations, and residences, for entry in the journal, which is kept by the junior clinical assistant.

"The patients looked at, von Graefe dictates the diagnosis to be entered and makes such applications as he deems proper, or dispatches the patient for more thorough examination either to the assistant on whom the ophthalmoscopic exploration of cases exclusively, and for the most part also the inquiry into the state of refraction and accommodation, devolves—at present Dr. Schelske; or to the second chair, represented by Drs. Arendt and Ewers, who also supply patients with their prescriptions, as directed by von Graefe. There is, however, comparatively little prescribing, as inward medicines, except in specific disease, are held generally to have but small effect upon the local disorder, and as the various local applications are in most instances not only made there and then, but the fullest scope is afforded for their speedy and frequent repetition, the attendance being daily.

"The preliminary examination by the assistants over (who are all qualified practitioners with a practice of their own), the patients again appear before von Graefe, furnished with a slip of paper on which is written the result of the examination—i.e., in many instances, the diagnosis thus made out—which is in ophthalmoscopic cases mostly verified by von Graefe either immediately or at a later moment.

"Frequently, the patients have to carry away with them, and re-present on their return, a paper with the diagnosis, the state of vision, the remedy applied, etc., marked upon it. Regular prescription sheets left in the hands of, and regularly to be produced by the patients, are not in use, and are in a great measure rendered superfluous by von Graefe's extraordinary memory. Whilst he attends, hardly any application is made but by his own hands; cauterizations, incisions and probings of the lacrimal passages, the applications of powder, ointment, and drops, opening of abscesses on the lids, even frequently the performance of dressings, are all sufficiently weighty with him not to be lightly entrusted to others.

"Homogeneous cases are brought by the attendant in groups in close succession, such as patients requiring their lacrimal passages to be probed; often a dozen of them will come forward presenting their probes, one or two, as the case may be, previously handed to them by the attendant. It is a

Fig. 8 (Ullman). The teacher. On the blackboard, Graefe's drawing of lid sutures. Probably 1856.

curious spectacle to see a number of persons seated in a row, each with two long, shining, tapering objects, stiffly projecting at his forehead like a couple of horns or antennae. We were struck by von Graefe's dexterous despatch in the performance of Weber's operation and the introduction of his probes.

"Readiness is with him the chief postulate, and it is efficiently secured. The patients, with rare exceptions, have their senses about them when questioned. Verbosity on their part is sure to be short-lived; nervousness becomes pluck itself where the minutes are so precious; the infant to be operated upon appears at the desired moment with its body firmly secured to the pillow by many windings of a roller; every requisite of dressing is unfailingly presented when the hand but moves to seize it.

"The blennorrheic and diphtheritic cases appear towards the close of the attendance. A number of them are always in-patients, brought down by their respective nurses. The junior assistant, so long engaged in writing, now steps forward to assist in the tedious manipulations which the cases of these little sufferers necessitate, who, with their heads fixed between von Graefe's knees, are the objects of his most scrupulous and laborious care.

"His vigilance in warding off all danger of infection either to his own or others' eyes by the utmost punctiliousness in ablution cannot be surpassed. No case of purulent or trachomatous disease is ever touched by him without resorting to the basin thoroughly to wash his hands with soap and water, whilst in particularly suspicious cases chlorine solution is superadded for the purpose.

"It is no exaggeration to say, that we have seen him clean his hands in this manner upwards of twenty times in less than two hours of attendance. Apparently, a most sorrowful experience has made him thus keenly alive to the necessity of caution. One of his assistants has had one of his eyes all but mutilated by diphtheritic infection. In certain cases where the risk may be apprehended of the discharge squirting into the surgeon's face, von Graefe even protects his eyes with a pair of plane glasses.

"The remedial agencies in which trust is here placed are few in number. Internal remedies, as we have said before, are little in request; for specific purposes mercury and the iodide of potassium—the latter often in combination with iodide of mercury—are appreciated. The preferred method for mercurialization is inunction. Of late, the Turkish bath has become a favorite resource, apparently for alternative purposes generally.

"For the ordination of quinine there is much less occasion than we find in this country. (Altogether, the out-patients, as regards appearance and intelligence, are of a different cast; as the national wealth of Prussia is yet far from the standard of England, so her national misery, if it ever should come to rival, has not yet attained to British dimensions). A combination of camphor and carbonate of ammonia is occasionally, at the

Clinique, ordered for the same purposes for which here the more expensive quinine is prescribed.

"Blisters are but sparingly made use of, and general depletion appears to be entirely abandoned. Local bleeding is utterly repudiated; and, in acute disease generally, very little resorted to. Contrariwise, in congestive conditions, especially those so frequently attending amblyopic disease, extensive use is made of Heurteloup's artificial leech, with the application of which a special surgical assistant is entrusted at the Clinique. The eye-douche continues to be held in deserved esteem.

"There are, further, the multitudinous orders for the various refracting glasses, either spherical or cylindrical; a kindred resource is the prismatic glass in muscular asthenopia, etc. . . .

"Nothing strikes the visitor more, though not at the Clinique only, but in Berlin generally, than the extraordinary number of persons wearing blue glasses. These, mostly plane, and ordered for the purpose of protection from the yellow rays of light, are now frequently preferred of the globular shape. The neutral tint or smoke-glass is seldom seen. . . .

"von Graefe lectures in the morning—i.e., Monday, Wednesday, and Friday—are also set apart for operating. This generally at 3 o'clock P.M., and is continued for about an hour, within which, on an average, 15 operations are performed. Some eight or 10 of the hearers regularly attending the lectures are in turn admitted to watch the operations, as well as the preceding attendance on the ambulatory patients.

"The remaining afternoons of the week, apparently devoted to the more collected and thorough investigation of cases, are passed in comparative seclusion; only a casual visitor being present, or some foreign colleague anxious to make the most of his limited stay in Berlin. But, on the operating day, the number of practitioners mostly equals or exceeds that of the pupils; and, amongst the former,

Fig. 9 (Ullman). Some of his disciples operating on a child. At Graefe's right hand, Dr. Swanzy of Dublin, administering chloroform; on Dr. Swanzy's right, Dr. Hasket Derby of Boston; on Dr. Derby's right, Dr. Theodore Leber; seated at Graefe's left hand is Dr. Evers, an assistant. 1869.

one or another person of high repute, or at least local celebrity, may often be met with. We had the good fortune of meeting Dr. Desmarres of Paris, Professor Rossonder of Stockholm, Dr. Melchior of Copenhagen, Dr. Heymann of Dresden, etc.

"The ordinary medical attendant of a patient is in many instances present to watch the operation on the latter and . . . the interesting spectacle is presented of a concourse of patients of each sex, belonging to the most various countries and ranks of society. Not to mention a host of counts and countesses, high functionaries and military officers, financiers, etc., we saw two children of royal birth, grand-cousins of King William of Prussia, brother and sister, operated upon in succession—the one for squint; the other for closed pupil in the only and but very poor eye left to her. Amongst the foreign pa-

tients, the most abundant are Russians, and next in number French. . . ."

Old Alexandra, Empress of Russia, became one of his most illustrious and importunate patients in the year, 1859, when both were on a visit to Genoa. His custom was, to take a vacation throughout August, September, and October, but since he was always seeing patients at the places where he went—whether in Würzburg, Paris, Heidelberg, or at Heiden in the canton of Appenzell—and meeting students and friends every day to talk about the conundrums and advancements of ophthalmology —it was more a kind of sabbatical leave than a real holiday.

"The Empress . . . has been bombarding me with telegrams," he wrote to Donders in March, 1860, "ever since last January, or she sends one of her sisters, or pleads with me in some other way. She wants me to come to Nice to attend to her there. I don't want to go but I suppose I shall have to—poor thing—her choroiditis has evidently got worse, and she is terrified—no wonder—one eye gone and the other seeing less and less every day. Did I tell you? She told me not to charge Count Tolstoi very much. . . ."

In the spring of 1862, he wrote Donders of another gilt-edged patient; "I dread to operate on the brother of the King of Würtemberg but will have to do it. . . . He has an orbital tumor and I will have to resect bone. Waldau has kindly consented to assist me . . . and . . . you know . . . I will be on my honeymoon. . . . I intend to leave within a day or two for Stuttgart. . . ."

Prince Wilhelm of Würtemberg, a girlish-looking young man with a mop of soft blonde curls, would not be operated on anywhere else but in his brother's apartment. He lay down on a narrow couch of yellow damask, wearing a long white satin robe de nuit, while his brother, twin to him in appearance but a few years older, sat by and held his hand.

Waldau had the great honor of being allowed to administer the anesthetic, letting it fall drop by drop upon the paper cone laid over the feudal nose. The moist Prince, murmuring and mewling, was soon lulled, but his repose did not last long. In the middle of the operation he turned into a madman and try as they would to control him, was soon off the couch and rolling and plunging on the floor.

They were in the midst of an attempt to get him back up where he belonged when all of a sudden he stopped fighting and ceased to breathe at the same time. He straightened out like a corpse. His face began to darken. In an instant Waldau was astride the stricken man reaching down his throat to pull his tongue out of it so he could breathe, and then Prince Henry of Würtemberg gnashed his teeth! As if to make up for everything else about him that was soft and effeminized, his imperial fangs were as sharp and strong as a wolf's, and when he clamped down, the bones of Waldau's hand crunched. Whitefaced, the would-be savior tried to get loose, sweat beading his brow and upper lip, Graefe doing his best to help him. In the meantime the brother Prince had run away to hide his face in the window draperies and stop up his ears with his fingers!

Somehow by the grace of God, hand and patient were both preserved, however! The operation then went forward,Waldau assisting as well as his mangled and bleeding hand would permit, for which Spartan chore he received 20 ducats from the grateful Crown and 50 from Graefe, who had been paid a hundred. But his best reward came the day following when Graefe's fair young bride insisted on dressing with her own hands the battle wounds sustained by her bridegroom's loyal assistant.

Another patient, but he came to the clinic with five servants and waited his turn like any other man, was enormously wealthy Don José of Havana, whose trouble was a cataract. On the day of the operation, at the very door of the hospital, Don José made a run for it and he and his entourage departed for home, but the next year he was back again. This time, his courage held up, he availed

himself of the expert help he had come so far to seek, and when the operation was over requested the cataract which was duly mounted in gold, enclosed in a crystal capsule, and inscribed with the words:

"Despues de Dios, Albrecht v. Graefe." "Next to God, Albrecht v. Graefe."

For the remaining four years of his idol's life, Don José sent a steady stream of rich Havana cigars to the Karlstrasse Clinic and exotic fruits by the ton.

Once-beautiful Countess Bismarck, wife of the Prime Minister whose place in Germany's history corresponds with that of our George Washington, was an easily upset patient who had to be excused from coming to the clinic. One late afternoon Graefe and Waldau were paying a professional call on the countess in her boudoir, when something hit with a great thud! on the outside of an inner chamber door of her room and landed heavily nearby. What could it possibly be?

Countess Bismarck, all a-tremble, was in the act of rushing to the spot when Graefe held her back and motioned to Waldau to go and investigate. Rather gingerly he advanced upon it and threw open the door. And who should be sitting in the middle of the next room, glowering at them malevolently, in an invalid's chair, his swathed and gouty foot stretched out before him, but Count Bismarck! The count made no explanations but what he wanted was a servant; situated in a position unhandy to the bed, he had picked up a handy boot and shied it at his wife's door.

Some said the painful attacks of gout he suffered were what spurred the Prime Minister on to such outlandish acts as dissolving the Diet, declaring that his own Ministry could deal with all affairs of state and forcing Austria out of the German Bund . . . but we have digressed far enough. Unless while we are here on this bypath and speaking of politics, we might say a word or two about the political beliefs held by Albrecht von Graefe.

The truth is, he was not an active participant in political matters, and on occasion was known to quote old Galenus, the thinker who advised "scholar-physicians" to abjure affiliations of diplomacy. It was Graefe's opinion that even without encouragement from Galenus most physicians would veer round such concerns anyway and he wondered if that was not the reason why they, as a group, had never been so well represented as other groups of lesser importance. When he was 20 years old Graefe wrote a school-mate a letter from Paris:

"The revolution goes on . . . and don't imagine I am straddling the fence. . . . No, my friend! I follow firm principles for which I am ready to bring any sacrifice."

He did not define what these were. That he had them, there is not a shadow of a doubt. It would have been characteristic of him to line them up early so as not to have to bother with them anymore:

"I believe this—and this—and this!" he probably said in the green years of his youth, stripping the deck for action. "And now, let me get on with the really *important* thing in life—my work!"

"In some instances, when persons of high rank, especially ladies or very nervous individuals among the private patients, are to be submitted to an operation," Dr. Samelson wrote, "students attending are requested to withdraw for a while; otherwise little distinction is made on account of the standing of the various subjects.

"Time presses; chloroformization, for that very reason often dispensed with, absorbs precious minutes; so does the dressing, when attended to by von Graefe himself; lid operations, especially blepharoplastic ones, are necessarily tedious; yet the task of the day must be performed, as postponement would soon result in an avalanche.

"Habituated to intercourse with persons of towering position, von Graefe, is ever at his ease; favored by birth, fame, titles, and badges, which all are his in plenty, he, the observed of all observers, is civilly genial with every one; stiffness, assumption, or pedantry have no hold on him.

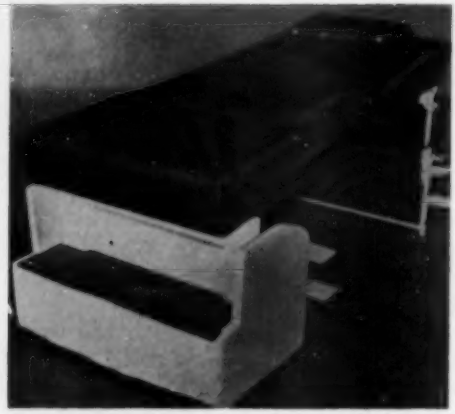


Fig. 10 (Ullman). Operating table. "It's my own invention." In use in the Graefe Clinic during last decade of its existence. White-painted iron, mattress covered with waxed cloth; tubular legs with device for elevating head; indentation for surgeon operating left eye; steplike box for storage of instruments and equipment, purpose of step unascertained.

"Remarkable is his considerate bearing towards practitioners who, as often occurs, happen to be present when a former patient of their own appears among the crowd of his patients. Apologizingly he appeals, as it were, to the indulgence of the colleague, and never fails to endeavour to restore the patient to his previous adviser.

"Exceptionally only, a patient is operated on in his or her own room; and the whole of the operations are performed by von Graefe's hand, except occasionally a squint operation or an iridectomy, entrusted, under his guidance, to the junior clinical assistant, for his benefit.

"The patient is invariably placed on the couch; the operator sitting, as the case may require, either before or behind him. Being slightly hypermetropic, von Graefe sometimes arms himself with his convex glasses when a minute inspection is deemed requisite.

"No operation on the globe of the eye is attempted without fixing it with forceps. The distention of the palpebral aperture is effected by means of the stop wire-retractor. The head of the patient is fixed by an attendant —trusty Andreas, well known to the professor's pupils and friends all the world over, on whom this sufficiently important task has now devolved for upwards of 13 years. Waldau and the other two assistants stand by. . . . It is the office of the junior clinical assistant to hold the tray of instruments, and to tender or receive them back as the moment requires.

"As a rule, the instrument maker (J. G. Birk, sen., Dorotheen Strasse) habitually employed by von Graefe is expected to be present during the operations. The nurses in attendance on the various cases are in readiness with their supplies to assist in the dressing of the patients, and to lead them back to their rooms. . . .

"Chloroform is given in less than half of the cases. In five days, we counted 40, in which it was employed. To its administration von Graefe generally attends himself, so long as his hands are still at disposal for the purpose; but, even when deeply engaged in operating, he is ever most sensitively awake to the behavior of the subject under chloroform, and, with delicate discrimination, directs either the continuance or the withdrawal of the anesthetic. He has never yet had to lament the loss of a patient from its influence. No apparatus is used, except a cylinder of pasteboard, lined with cloth, open at both ends and tapering upwards, of about three inches' diameter at its base, which has a shallow notch for the nose. The chloroform is poured on the lining. In the appreciation of the symptoms of danger, little stress is laid on the condition of the pulse: the state of the respiratory function absorbs the attention. . . .

"The teaching arrangements at von Graefe's Clinique, apart from the practical lessons implied in the afternoon work which we have just reviewed, appear to call for a separate notice. Here we find, as it were, a little university of ophthalmology establishment.

"Dr. Waldau teaches the ophthalmic oper-

ations in a course of 12 lessons, giving, we believe, four such courses in each of the two academic divisions of the year.

"Dr. Schelske, the scientific assistant, as we call him, whose office was but recently, after a tenure of some years, vacated by the eminent pathologic anatomist, Professor Schweigger, gives three different courses of instruction—one on ophthalmoscopy, another on refraction and accommodation, and a third on the pathologic anatomy of the eye.

"Professor von Graefe himself discourses on the diseases of the eye, as we have stated, three times a week, from 10 to 11 o'clock in the morning.

"There were, on an average, from 50 to 60 hearers attending—among them always a number of qualified medical men. They are seated on chairs in two double rows, confronting each other, and leaving a passage between them for the patients presented, and particularly for the lecturer, who seldom occupies a seat, and ever and anon repairs to the black-board, which, though movable, rivals indeed the most stable of fixtures: it is his most cherished instrument of instruction, in the use of which, whether lecturing, or conversing, or pausing from an operation, he is untiring, and the convenience of which he is very apt to suggest to any party conveying or seeking some information.

"The cases to be produced are, on the day preceding a lecture, selected by von Graefe himself, or more frequently, under his direction, summoned by the junior clinical assistant; who also, seconded by one of the male attendants, controls their movements to and from the lecture room.

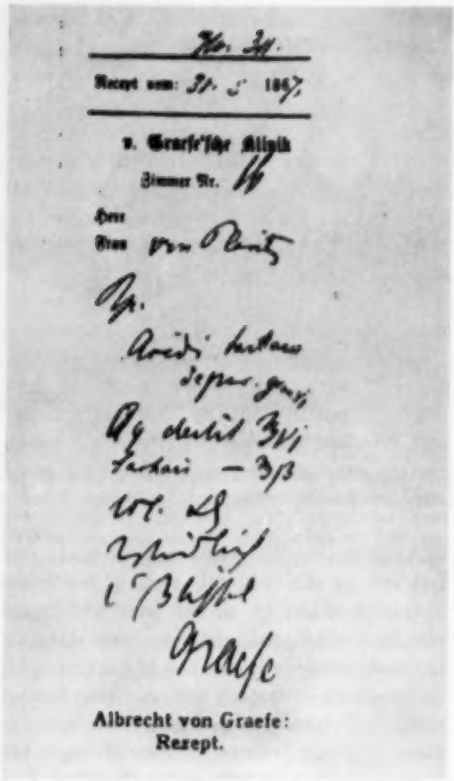
"Some four or five of those among the students who believe themselves to be sufficiently advanced not to be listeners only, examine the cases previously to the lecture, in order to prepare themselves for the impending interrogatory.

"The lecturer does not profess within a given period to exhaust the whole subject of ophthalmology; his lectures are clinical in the received sense of the term. As cases emerge, or a series of cases, invested with practical interest, they are made the substratum of instruction. There is, however, scarcely anything of importance missed during the term; and whatever is taken up is certain to be exhaustively treated. The number of cases dwelt on in this manner are from two to five in the course of a lecture, towards the end of which as many or more are cursorily dealt with.

"Not unfrequently, the suggestion or request of a friend is sufficient for a subject to be made the item of discourse. The delivery of the lecture is spirited in the highest degree, signalized by the most perfect ease and freedom, sometimes perhaps too rapid, though ever elevated in style. The tone is very frequently colloquial. . . ."

After midnight Graefe always made one last call at the hospital, visiting his latest operative cases. If, to the ones who could see, he looked on those occasions, standing in the doorway or by the bed in the dim light, curiously like Another with his long brown hair, soft brown beard and undespairing gaze, it is not perhaps so very strange. He resembled Him in more ways than one. For those moving in pain he gave laudanum, changed dressings, or made compresses. Especially to the charity patients on the third floor in the overcrowded rooms under the eaves, hot as a furnace in summer, without a breath of air, did he seem to come as a deliverer.

Climbing the last long flight of stairs grew more and more difficult as the years went on, and often he had to stop to rest and catch his breath, pronouncing, as he did so, many an interesting remark to the assistant who happened to be with him (dictums handed down like heirlooms in certain European families to this day), and letting fall from his lips many a wise observation, as though he felt impelled to make up for his show of weakness in this way. Often he told a joke or made a grievous pun by way of diversion. Once, pausing on the stairs at midnight with



Albrecht von Graefe:
Rezept.

Fig. 11 (Ullman). A mild laxative for Frau von Plentz.

Dr. Zehender and laboring for breath, he said that if he made as much money as physicians used to, he would have a hospital all on one floor.

"Towards the end of the last century there was a very clever and renowned doctor in England by the name of Thomas Dimsdale," he said, "so clever and so renowned that Catherine the Great sent for him to come and innoculate herself and her son against small-pox. And can you guess how much she paid him? Fifty thousand dollars! Plus ten thousand dollars travelling expenses, a life-long pension of twenty-five hundred dollars a year and the rank of Baron of the Russian Empire! Besides, she invited him to tea."

After 1868, it was no longer possible for him to make regular visits to the third floor, but he continued to look in at the hospital late at night, a trusted assistant being sent above to see that all was well. Returning, the young man was always cross-questioned and woe to him if he neglected to mention some eventuality that his chief considered important. Sometimes, when there was a very bad case on the third floor, or one that needed him particularly, he would go in spite of everything.

Ottilie, Wanda, Cousin Mathilde, all three happily married and established in homes of their own, had long since given up trying to find a match for spouseless Albrecht, when one spring afternoon in 1861, an ill and elderly Danish nobleman entered the clinic, supported on one side by his wife and on the other by a blonde young girl of 18, Anna, Countess Knuth. Graefe did not know she was a countess. She could have been a kitchen-maid and it would not have made any difference. He took one long look and henceforth was lost to her.

Graefe had never been much concerned with his appearance, and would have liked nothing better than to come into this world suitably and permanently decked for traffic with his fellows like the cony or the camelthorn without needing to change either fur or bark. That being out of the question, next best was to save valuable time and effort by wearing the same ensemble year after year. His female connections provided or insisted upon certain pragmatical reinforcements and supplements to his attire but he tried to keep these to a minimum.

Some years before, on a stroll with Horner in the Appenzell, when the wind carried off his hat and his long hair whipped about his face in a way distressful to see, his thoughtful companion gave him his own hat "to wear home," apologizing for its shabby condition and great age. Long after, visiting in Berlin, what should the good Zürich professor see but his friend Graefe wearing this same miserable old hat here, there, and

everywhere—even to the Palace of the Emperor!

Now, however, a change was wrought, at least during that "soft impeachment," the time of courtship. Paying his addresses to Anna, he became as squeamish about the fit of his coat, the hang of his trousers, and the color of his cravat as any beau—or Papa Juengken.

He was a notably handsome and well-grown man. It was said that blind or near-blind patients upon whom he operated, when they had eyes again and could see him, previously known but by his gentle touch, pleasant voice, and the warmth of his humanity, when they could see who it was who had redeemed them from darkness, were as dazzled by his looks as if an angel had stepped down from heaven.

What consequences may have ensued if Anna had turned down her suitor's proposal of marriage, there is no use to consider for she said "Yes!" with all her heart. Their marriage date was set for early in December. The betrothed couple, the countess chaperoned by a middle-aged gentlewoman named Nicoline Gutzen, and Graefe accompanied by his friend and assistant, Dr. Julius Arendt, met for a few days in Baden-Baden late in September, for the hot baths the ancient Romans had once enjoyed, and to beguile the time together.

One evening after a long and idyllic day, Graefe came in very late to find Arendt reading by the parlor lamp. "It's colder outside than I realized," he said, going directly to the stove and stretching his hands out to the heat. He shivered, his eyes very bright and his cheeks spotted with red. "But you should see the stars." His teeth began to chatter and Arendt threw him a narrow glance, beginning to close his book. "The most beautiful night you ever saw!"

And so it was, wakeful Arendt had to agree when sometime after two in the morning he began to gaze worriedly out at the moonlit trees and steep roofs beyond his window, as a change from pacing the floor in the room of his sick companion. For soon after retiring, Graefe had shown signs of alarming illness and Arendt kept watch all night.

The next day, so desperate were developments, he sent to Berlin for Professor Traube who came at once to find his well-remembered former pupil at death's door with chills, high fever, and pleurisy. Traube in turn sent for Graefe's sisters and they left their families to rush to their brother's side in the melancholy belief it was to see him for the last time. Their tears mingled with those of his stricken fiancée who refused to return to her home in Federicksborg, Denmark, and who, in fact, never left him in life again.

In January he was able to compose a letter to Donders:

"I can be out of bed now," he wrote unsteadily, "and am allowed to walk in my room, up and down, for 10 min. at a time. But I still have a few things to complain of. My chest feels as if it is made of lead. . . . Headaches lie in wait for me at twilight and swoop out like bats. . . . I can't sleep . . . but . . . one supreme joy . . . my beautiful Anna and I will never part—we have made a lover's agreement. When we will be married, alas, I do not know. Her father died some weeks ago and her mother has come here to Baden-Baden, they are in mourning. . . . My lovely girl is ever at my side; she tries to support me as I walk. Every day . . . we talk about our wedding. . . . Next month we are going to Nice. . . ."

Three months later, from that agreeable resort, he confided to the same correspondent:

"I am better . . . very different from the miserable wretch who arrived here wrapped in a blanket. Although I was carried on a litter, I had to stop and visit that little colony, Ferney, on Lake Geneva, where Voltaire brought his watchmakers and settled down for twenty dream-like years . . . the trees in the garden of the chateau were leafless, but Anna and I stayed there quite a long

Fig. 12 (Ullman). Joy as it flies. Anna von Graefe standing beside her husband a year before his death; she lived to mourn him two years.

time, talking. . . . Nice is a wonderful place for invalids. I began gradually to walk again, at first slowly—like a snail, in fact—no legs, no lungs. But now you would be proud of me for I think I could walk four times around a Crystal Palace with you if I had the chance! We are leaving Nice on April 5th or 6th and I intend to be home by May 2nd. And the week following . . . my beloved will become my bride. . . ."

On June 7, 1862, Albrecht von Graefe, aged 34, and Anna, Countess Knuth, aged 19, were married. Only a few friends and relatives attended the ceremony. On the huge Meissen vase, given as a wedding present by King Frederich Wilhelm IV, was painted the place—the little church of Sacrow, by the winding river Havel—and the time—summer, full of "Deutsche Blumen," birds and sunshine.

Whom the gods would destroy, they first make happy, does not the saying go? That year of 1862, at the height of his fame as scientist and ophthalmologist, owner and director of a celebrated hospital, performing the work he loved, his health mended (or so he thought), married to the one being he adored, possessor of a luxurious home, untroubled by financial cares, surrounded by true friends and a host of admirers, Albrecht von Graefe must have been the happiest man, or one of the happiest men, alive on earth.

He often told himself so, as, before dinner, he and his lovely bride took a leisurely drive or perhaps a walk through the Thiergarten, or when, returning home late at night with two or three congenial companions, he found the homelike but elegant salon deserted and a satisfying repast laid out in the dining room, ordered by her, now lying upstairs asleep, who thought of everything to make his domestic life pleasant. He and his guests would eat, drink a glass of Rhine wine, and then, lighting cigars by the cheerful fire or out on the terrace, settle down for a lengthy conversation. It was his habit to go to bed late and rise late.

Graefe, like Tennyson in England, preferred the company of men; women, except his wife, bored him. He was seldom seen at balls, although he and Anna sometimes attended the theater or opera. Since she was as fond of a quiet home life as he, they soon settled into a social isolation bordering on reclusion that satisfied their every wish. And soon the babies started arriving. . . .

Not in an instant, not like an enchanter's vision that vanishes in a puff of smoke, did this happiness depart, now you see it and now you don't. No, when it began to slip and go, it went daily, a little every day, and then more was gone and more, and it began to go hourly, and at last, minute by minute it went until there was nothing left at all. . . . And when did they first know their house was built on sand? And death had got his foot inside the door?

"I thought I was going to have to operate on my dear wife," Graefe wrote Donders in

January of 1863. "How I dreaded it but it seemed that a neurotomy for facial spasm would have to be performed if her suffering was ever going to stop. Morphine injected in the temple had finally failed to bring any but slight relief and I was just ready to operate when she got milk fever and the spasm of her face disappeared."

Boerhaave once said, "Opium is the finger of God." It was probably during that memorable year of 1863, which saw the proclamation that freed the American slaves, the discovery of bacteria, and the death of Thackeray, that long and dreary winter, when Albrecht von Graefe, working too hard, worrying over his sick child and sicklier wife, ailing himself—he had a feverish sore throat and bad coughing spells—began to use morphine.

He felt no disrelish at the thought, knew no irresolution. With morphine he could carry on. Without it, his work would come to a standstill for longer than he cared to anticipate.

Intending to discontinue its use as soon as his health rallied, and taking it as seldom as possible, he began with small doses, injecting the morphine into his temple and scalp by means of a Pravaz syringe made of metal. But as first one year and then two and three years went by and he felt insidiously less well, while his devotion to his work regenerated in proportion as his strength diminished, so did his habit grow upon him until, by 1866, it was firm fixed. He could not shake it off.

In *The White Plague* by Rene and Jean Dubos, this passage occurs: "Accounts of the treatment of phthisis during the nineteenth century reveal that opiates were then almost universally used to quiet cough and diarrhea and to ease mental anguish. Opium-eating had been adopted by the Romantics in the circle of Schiller in Germany, then by those in England and France. It had become part of a . . . creed. . . . It is probable that every consumptive became, in some measure, an opium addict. . . ."

The nepenthe was to become indispensable to someone else in the Graefe domicile.

"Sweet Anna suffers again from facial spasms," her anxious husband wrote Donders in January of 1864, "this time without being pregnant. Morphine is the only thing that helps although not before 4 to 6 injections have been given in the temple and 3 to 4 days of truly indescribable anguish have passed. I am afraid I will have to operate on her after all. My needle no longer finds the nerve because of scars. How I hate to cut this dear and beautiful face of hers, now so worn with suffering. . . ."

In April he wrote: "Well, I finally operated on Anna and cut the nerve. So far, thank God, the results are all I could have wished. She has no more pain. But my poor baby girl's eyes are afflicted with corneal ulcers. . . ." The following winter the news from him was: "My daughter's eyes have one corneal infiltration after another. It is like a judgment. Why? What have I done? I have become as introspective as Job. We have another child, a fine girl. She seems healthy. . . . I hope so. . . ." When she died six months later:

"I can't," he wrote, "I can't get over her loss, and if it is bad for me, think what it must be for the mother in whose arms she lay. Anna is overcome with grief, besides having a new attack of her agony, the facial spasm—it is dreadful. And her kind mother, who has been such a stay to our household in the midst of these calamities, now she, too, has been brought low with an ominous disease of her womb. As to myself, I am not so bad, coughing more than I like and very conscious of my chest, but not so bad. . . . My poor wife can no longer endure life without injections. . . ."

He did not say that he had come to very nearly the same pass.

It was the custom in the Karlstrasse clinic, while the reception room was being prepared for the afternoon's operations, for the surgeons to "refresh" themselves by washing

their hands and faces, drinking a cup of cold water, or perhaps taking a short turn on the open porch in back over the garden saloon.

After 1863 the time for "refreshment" began to mean to Graefe the time for an injection of morphine, and after 1866 he performed few or no operations without its support. Plans for these, as ever, were carefully laid beforehand, surgery was slowly and meticulously executed. "Afterwards," says his biographer Hirschberg, "he dictated what he had seen *before* the operation, what he had found *during* the operation and what he attempted to accomplish *by* the operation."

These reports were delivered daily to his home where they were used as the basis for his clinical publications. When she was able, Anna loved to act as his secretary and would sit as long as he would dictate, tossing her morning braids, biting her lower lip with earnestness at the consequence of her task and write down in a round girlish hand everything he told her to. His stay at home seemed so short, however! in no time he was kissing her and taking his leave.

In the summer of 1865 Donders received a blithe letter saying:

"My daughter's eyes have recovered with very little damage to the sight. She is a good child, and so winning. . . . We moved into our new home at Bellevuestrasse 16. It has a small winter garden where my Anna tells me she will raise African palms and crimson oranges. . . ."

Sometimes things seemed to be going well, more often in a way that caused Graefe, as he did on a wet March day in 1867, to take pen in hand and write drearily:

"O my friend Donders, is time then going to exact payment for every hour of happiness? My daughter's eyes have flared up with ulcers again—Anna is in purgatory with her facial spasms. She craves ever more injections as they are driven away only to return. . . . My poor mother-in-law, long so ill, now has cholera. . . . I gave a long lecture in an overcrowded room and began to spit blood, but I don't think the exertion caused it. The night before I took a nasty fall on the icy sidewalk in front of my house. . . ."

He tried diversion, change. When August came, instead of vacationing in his usual haunts, he sought after health, going to one famous health resort after another, sometimes with Anna, sometimes alone. Others benefited by such a regimen, why not they?

"Did you hear that old Sichel died?" Graefe wrote Donders in 1868 from such a resort. "I understand he worked to the last correcting his proofs for our *Archiv*, practically while an operation to crush his bladder stones was going on. They say he was so engrossed that he hardly suffered, you know he always was a demon for work. How is that for a stoic? He seems to have been penniless. And Desmarres was so rich! you know he hid 700,000 francs in a bureau drawer, hoping to keep it out of the hands of his heirs. Oh, this ragfair of a world. . . . Sichel was a good man; the only trouble with him was, he was a little too much of a ranter for most people's taste."

He added: "things seem brighter. We are building some more rooms to the house, so as to have a place to put the things we have bought on our various journeys. The days that my little soul and I felt well at the same time, we would go shopping. . . . Few enough, alas, although to see our purchases, one would suppose they were many."

Warm April in Naples brought a lift to his spirits:

"My general health is improving," he wrote, "I cough less, expectorate little, and can walk about, but I have to take at least three morphine injections a day. The minute I stop taking them I get worse. If my wife were not enciente (7 months) and if I did not think it best for her to be home in Germany for her delivery, I would want to stay on here indefinitely—that is, if I did not have work to do. Bowman was here for a few days. We had a great reunion, of course, talked about our Dutchman and much interesting shop-talk."

They did not go directly home but made a trip to Paderborn, also to an island in the north sea which proved to be too cold for enjoyment, and then to Inselbad in Westphalia where Anna, stricken with pneumonia, was delivered of her fifth child and second son. He was born only to die 11 days later, and his father seemed to decline rapidly from that time on. At New Year's time he wrote:

"My health is really failing. Acute pleurisy, with pain, hoarseness and coughing blood, but no fever. Traube made me come home yesterday and promise not to go back to the clinic for 10 days at least. He wants me to sleep and rest. My God! I am sure now that the process is one of generalized T.B. If my sweetheart was able, I would take her and go to Italy—or fly—where? Kennst Du das Land? But she is in bed again. What we would do without Nicoline Outzen I do not know. She has been with us ever since our marriage."

In November of 1869, some four months after the death of his newborn child, Graefe performed an operation before several visitors to the Karlstrasse clinic. One of them was Dr. Wilhelm v. Muraldt of Zürich who sat down that evening in his lodgings and penned a letter to his old friend Professor Horner:

"Your admired von Graefe came up to all expectations," he wrote, "except that I did not suppose him to be so gray, and I must tell you he is wasted, pale, and far from well. He operated with the great skill of which you boasted although I noted a slight tremor in his hand. His lecture was a revelation, his voice being rather thin and weak at the beginning but swelling later, growing rich and strong.

"I sensed—what shall I say—hurry—yes, hurry: when he came toward the end of his sentences he would slur the words somewhat, impatiently, or break off with 'et cetera' or 'it goes without saying.' He seemed to want to *leap* to the new thought and be irked by having to finish the old one aloud when everybody—surely—after all his preaching and teaching—must know what he meant! I was moved by the way he almost beseeches his listeners, his passion for this subject of which he is the master, being so great. He uses the blackboard very frequently.

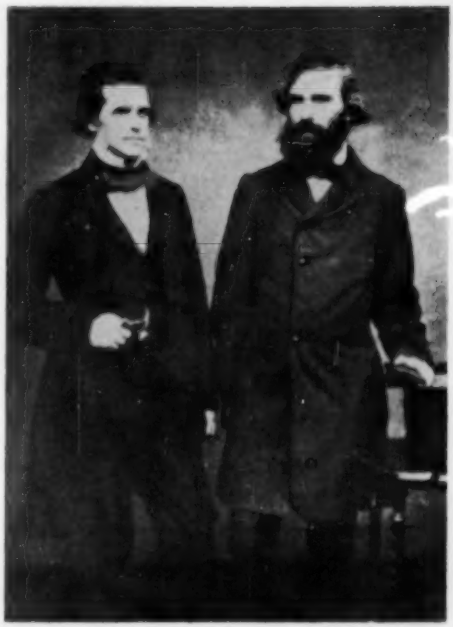


Fig. 13 (Ullman). The best of friends must part. Sir William Bowman and Graefe. Last meeting, Naples, 1869.

"He coughs hard at intervals, putting his handkerchief up to his mouth. . . . He looked fatigued as he left the clinic. I understand he has many domestic sorrows. His wife is said to be very ill."

For the first time, his beloved work began to pall:

"Dr. Hirschberg is a great help, taking shorthand and keeping precise records. But the senseless practise crushed me almost," he wrote, "60 cataract extractions and 15 iridectomies in the last month! It is brutalizing. I have to remind myself of the importance of my work. Imagine, Donders, me. Remind myself. . . ."

In May 1870: "I am a scarecrow, fit to be admired by Lord Byron. I . . . suffer, Don-

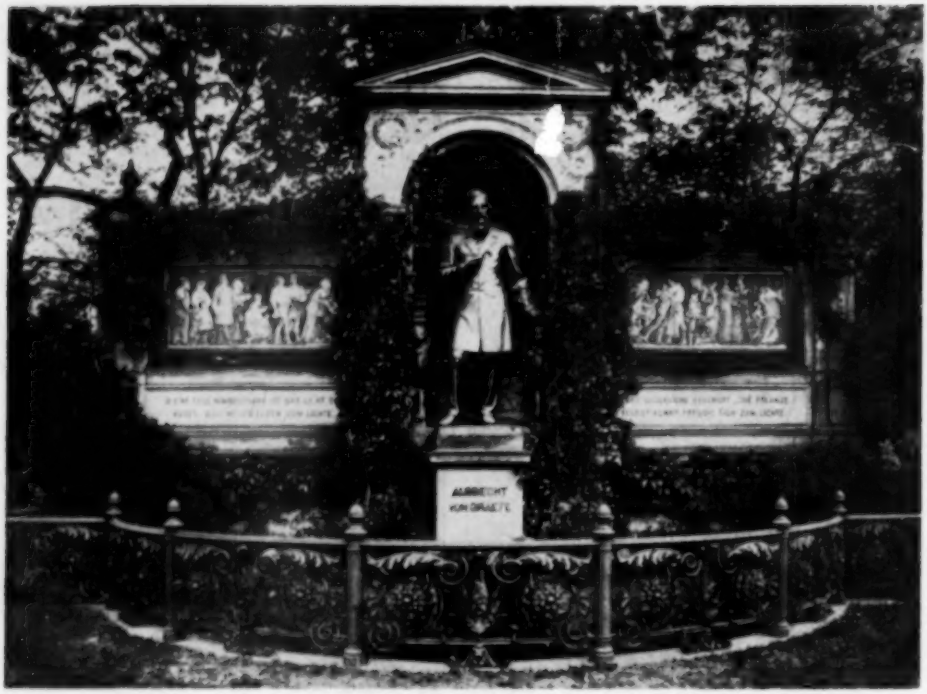


Fig. 14 (Ullman). "All creatures yearn for light. . . ." The monument to the glory of Albrecht von Graefe. In the Charité, Berlin. Unveiled, 1882.

ders. More than anything, just now, from my bladder, and I fear that something there is hopelessly wrong. I am up about 10 hrs. a day. I try to be in the clinic for 4 hrs. at least. Oh, the work to be done—and it worries me to have to leave so much to others, though they are all good boys and willing and clever. I still lecture a little but not long at a time. . . ."

July 2, 1870: "It is wonderful how the body will live, and *lives,* in the very center of a morass of dying, even when the mind says no, no, it cannot go on. I am very bad. Very bad, my dear old friend. . . ."

He was sleeping. He knew it was now, but it was a long time ago besides. He had been out almost until morning "walking and singing at night" with Nero, and Kuemmel, and Knight and Bembo, his good Camellias . . . strolling under the dark trees hung with Japanese lanterns, and he had recited Eichendorff's little poem beginning, "Along the Amber Route we came, but we will not go back that way. . . ."

The day dawn was beginning to streak the sky when he crept into the house on tiptoe so as not to wake mother, and the birds were twittering. They were very loud. Even with the pillow pressed over his head he could hear them. Worst of all—that everlasting military band, those horns blowing and cymbals clashing!—the regiment that had stood guard at the palace was on its way out to the parade ground for exercise. He cried out in torment, "Can't it be stopped? Can't the noise be stopped? So early in the morning. . . ."

"It is not morning, Herr Professor, but night."

"Night, my darling?"

"She has gone downstairs for a little, Herr Professor. I am here with you. . . ."

"Peters?"

"Yes, Sir."

The sufferer tried to smile at the young editor and publisher who had taken over the *Archiv*, the friend who had been beside him every day since he was brought to bed.

"And I, Albrecht, I am here."

"Traube?"

"Right here, you have nothing to fear."

They left at about two in the morning.

"I had hardly got home when I was sent for," Peters wrote Professor Arlt in Prague the next day, "and had to return to him. We left him sleeping but his wife said that no sooner had we gone then he woke and tried to sit up. He became very much agitated, she said. She gave him morphine, but when he wanted more, and more, she did not know what to do so she sent for Traube, and the servant came and got me, too.

"To see him in his ordeal, struggling to breathe, gasping, dying for air, was almost more than flesh and blood could stand. We propped pillows behind him. . . . His young wife sat on the edge of the bed—it was oh, so bad for her—the lady who acts as her companion stood by, and so did I—and on the other side of the bed was Traube, holding his pulse. I could see by Traube's face. . . . Suddenly our Graefe's head fell forward and hung towards his left side. . . . The clock was striking—three o'clock."

Fig. 16 (Ullman). Death mask photograph. The von Graefe Archives, German Ophthalmological Society of Heidelberg.

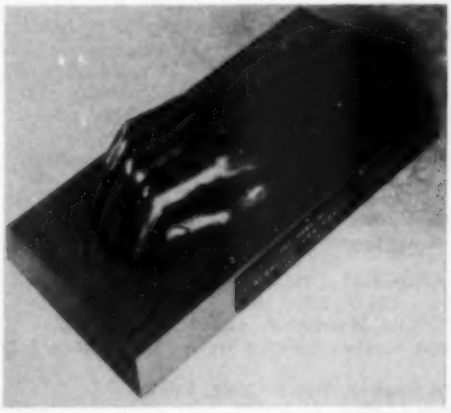


Fig. 15 (Ullman). Bronze cast of the master's hand a year before he died. Gift to the author from the von Graefe Archives, German Ophthalmological Society of Heidelberg, through the courtesy of Dr. E. Engelking.

A few hours later, in the sunny world beyond that darkened room where he lay, there was a blare of martial music and the quick tread of marching feet. No mere change of the palace guard, this time, disturbing the dreams of the dronish Berliners, but the noise of a whole garrison in arms, at harness,

in battle array, going away to take the field in France. War had been declared! The time was July 19th in the year 1870, and the fifes shrilled and the drums rolled.

In early fall, Bismarck's soldiers accidentally shelled the Paris Museum of Natural History and a French journalist printed the accusation that Germans were not Teutonic at all but directly descended from a ferocious and savage Mongolian race!

Rudolph Virchow, taking this as a personal insult, put hundreds of census takers to work to manifest the exact color of the hair and eyes of every single solitary boy and girl of the six million schoolchildren in Deutschland. Blonde hair, if you please, and blue eyes, thank you. The *Franzosen* could put that in their pipe and smoke it!

Fig. 17 (Ullman). The Graefe Medal.

Had the Karlstrasse clinic still been running, not shuttered and locked as it was two days after the death, in the 42nd year of his age, of its famous director; were it midnight again, was he there once more as he used to be, Albrecht von Graefe, seeing that all was well for the night . . . did he linger there as he once would do on the long flight of stairs up to the third floor, catching his breath . . . he and his young assistant might well have gossiped about the Dean of Medicine and his inventory. A little, at least. Graefe would say something wise, something droll, perhaps. And oh, his smile would make the shadows flee!

2606 N.E. Broadway (12).

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ROLE OF VITAMIN A IN HEALING CORNEAL ULCERS*

L. P. Agarwal, M.S., and H. N. Adhaulia, M.B.
Agra, India

Very little work on the therapeutic role of vitamin A in corneal ulcers has been done. It has been established that vitamin A maintains the functional integrity of the cells covering the body surfaces, thereby preventing invasion of micro-organisms.[14] In addition, vitamin A helps to maintain normal nerve tissue, promotes normal growth of bone and tooth enamel, and participates in the visual cycle of dark adaptation. In deficiencies of vitamin A, Cameron[2] pointed out that there is lowered resistance to general infection. Friedenwald, et al.[5] have shown that in deficiency of vitamin A, mitotic activity of cells is inhibited.

Vitamin A in the form of cod-liver oil has been used for a long time in general wound healing. Though scarlet red in cod-liver oil was used for a long time, Smith[18] used Albucid (30 percent) in cod-liver oil.

Earlier investigations

Horton[9] pointed out that epithelial regeneration was enhanced by cod-liver oil drops and vitamin C orally or parenterally. Ryrie,[16] Banyai,[1] Lohr and Zacher,[12] and Steel[20] pointed out the epithelial regenerating effects of vitamin A in the form of cod-liver oil in leprous ulcers, tuberculous ulcers, burns, and wounds.

Sia-Boan-Lion[17] found in gonococcal conjunctivitis the vitamin-A level decreased with involvement of the cornea. He pointed out that the decrease in vitamin-A level was directly proportional to the severity of the corneal lesion.

De Grosz[6] used vitamin-A preparations locally in corneal abrasions and ulcers with favorable results. Yudkin[21] was not impressed by the local use of vitamin-A preparations and was supported by Schmidtke[16] and Stahel[19] but these authors reported beneficial results in ocular inflammations by the parenteral use of vitamin-A preparations.

Kentgen[11] reported definite beneficial results of vitamin A in herpetic lesions of the eye. Hamilton[8] commented that vitamin-A administration in corneal ulcers definitely accelerates healing. Clarkson[3] reported beneficial effects of extra amounts of vitamin A in dealing with abrasions after removal of superficial foreign bodies from the cornea.

We (1954)[23] pointed out that an extra supply of vitamin A accelerated the healing of corneal ulcers by stimulating the proliferation and regeneration of epithelium.

Present investigations

In 30 individuals, belonging to the class from which our cases of corneal ulcers came, vitamin A and carotene investigations were done to ascertain the range of vitamin A and carotene levels in plasma in this country (table 1). These individuals did not show any clinical evidence of vitamin-A deficiency.

The study was then divided into two main groups: experimental and clinical. The experimental work was undertaken to assess the role of vitamin A in the healing of corneal wounds and the clinical study was done to find out if vitamin A in any way lessened the healing time and density of scar formation in three varieties of corneal ulcers: (1) nonsloughing, (2) sloughing, and (3) hypopyon corneal ulcers.

Material

Albino rabbits were chosen as experimental animals for this work. A study of 70 cases of corneal ulcers was undertaken. Vitamin A was estimated by the method

* From the Department of Ophthalmology, Medical College, Agra.

TABLE 1

VITAMIN-A AND CAROTENE LEVELS IN PLASMA

	Maximum	Minimum	Average
Plasma vitamin-A level in I.U./100 cc.	107	64	73.7
Plasma carotene	136	68	99.5

adopted by Mann, et al.,[13] a modification of Yudkin's method.[22]

METHOD

Experimental

All the experimental animals were fed on adequate vitamin-A diets. Two types of injuries were produced: (1) Superficial and (2) deep (Gunderson and Liebman[7]). Three rabbits in each group were studied. In each group one rabbit, used as a control, was administered no vitamin A, while 10,000 I.U. of vitamin A were given daily, intramuscularly, to the remaining rabbits until the artificially produced wound healed completely. In all rabbits the vitamin A and carotene levels were estimated, by the technique already described, before the corneal injury and after the corneal wound had healed.

Clinical

Of the 60 cases studied, 30 were used as controls. In the control cases, the routine treatment of corneal ulcers—carbolization, penicillin drops (5,000 u./cc.), atropine ointment (one percent) and wet fomentations—was used. In the remaining 40 (noncontrol) cases, in addition to the routine treatment, vitamin A was given intramuscularly. Vitamin A and carotene levels in the blood were estimated at admission and after the corneal ulcer had healed.

Doses. Vitamin A (300,000 units) was given intramuscularly on the first and third day of admission; thereafter 100,000 units of vitamin A were given until the corneal ulcer healed completely.

Observations. The initial and final values of vitamin A and carotene in the blood were recorded. The healing time (in days) of corneal ulcers and the type of scar formed were also noted (tables 2 to 9).

In the experimental animals, the extra amounts of vitamin A administered intramuscularly considerably accelerated the healing process in the experimentally produced corneal wounds, both superficial and deep. The density of the scars in both types of wounds was also reduced. In both the control and the noncontrol animals, the final carotene level showed a steep decline, in spite of the same diet.

In clinical cases of corneal ulcers, the following observations were made:

TABLE 2

EXPERIMENTAL SUPERFICIAL CORNEAL WOUNDS*

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level		
	Control (no vitamin A given)					
1	104	28	104	2	4	None
	Noncontrol (vitamin A administered)					
2	105	20	120	5	2	None
3	100	15	132	—	2	None
4	103	20	125	—	2	None
5	104	26	116	1	3	None

* The injury produced by the method of Gunderson and Liebman.[7]

1. *Nonsloughing ulcers.* The initial vitamin A and carotene levels in this group did not show any vitamin-A deficiency as the average figures were comparable to the normal levels both in the control and noncontrol groups. The final levels also did not show any marked deviations in both groups in spite of massive vitamin-A administration in the noncontrol group.

The healing time (table 10) in cases in

TABLE 3

EXPERIMENTAL DEEP CORNEAL WOUNDS

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level		
			Control (No. vit. A given)			
1	106	8	104	—	8	Dense
			Noncontrol (Vit. A given)			
2	103	12	130	6	5	Thin
3	112	—	128	—	6	Thin
4	106	6	118	—	5	Thin
5	104	8	120	4	6	Thin

TABLE 4

CLINICAL NONSLOUGHING ULCERS (CONTROL CASES IN WHICH NO VITAMIN A WAS GIVEN)

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Levels	Carotene Level	Vit. A Level	Carotene Level		
1	74	88	74	98	7	N
2	78	86	80	93	22	M
3	68	92	69	98	6	N
4	98	78	98	86	8	M
Average	79.5	86	80.25	93.75	10.75	—

TABLE 5

CLINICAL NONSLOUGHING ULCERS (NONCONTROL CASES IN WHICH VITAMIN A WAS ADMINISTERED)

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level		
1	86	92	89	98	10	N
2	68	90	72	98	7	N
3	67	92	72	98	8	M
4	82	86	83	92	9	N
5	78	92	78	96	8	N
6	64	84	70	94	14	M
7	84	82	85	88	9	N
8	62	82	64	96	6	N
9	82	100	86	104	8	M
10	84	92	89	98	7	N
11	84	90	87	97	10	N
12	80	96	85	103	10	N
13	72	82	76	90	7	N
14	78	93	84	101	8	N
15	74	85	83	90	9	M
Average	76.33	89.33	80.33	96.30	8.66	—

TABLE 6

CLINICAL SLOUGHING ULCERS (CONTROL CASES IN WHICH NO VITAMIN A WAS GIVEN)

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level		
1	68	90	70	110	39	L
2	80	87	84	98	31	L
3	70	92	76	102	26	M
4	72	60	78	93	27	L
5	60	80	63	97	22	M
6	68	86	71	97	27	L
7	92	70	96	104	12	M
8	64	80	70	91	20	L
9	80	87	80	86	18	L
10	68	79	72	86	31	L
11	80	79	81	87	27	L
12	60	73	62	68	15	M
13	58	80	63	93	24	L
14	76	82	98	94	21	L
15	78	88	79	89	14	L
16	65	78	66	80	11	L
17	86	80	87	92	17	M
18	78	83	78	87	19	L
19	68	76	71	86	14	M
20	76	80	77	88	9	M
Average	72.35	75.6	75.1	91.4	25.05	—

TABLE 7

CLINICAL SLOUGHING ULCERS (NONCONTROL CASES IN WHICH VITAMIN A WAS ADMINISTERED)

No.	Initial Values		Final Values		Healing in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level		
1	80	76	82	84	11	N
2	66	88	73	108	14	M
3	78	88	87	100	27	L
4	76	87	80	93	22	L
5	72	92	77	99	29	L
6	74	80	79	94	10	M
7	64	84	70	94	14	L
8	68	98	72	110	14	M
9	65	96	68	16	14	M
10	70	80	76	98	8	M
11	82	78	86	88	14	L
12	84	90	87	97	13	M
13	58	78	67	102	23	L
14	66	80	68	98	9	M
15	72	98	76	116	10	M
16	70	82	72	100	15	M
17	76	87	81	90	17	M
18	78	89	82	102	14	L
Average	72.16	86.16	76.83	92.72	15.44	—

TABLE 8

CLINICAL HYPOPYON ULCERS (CONTROL CASES IN WHICH NO VITAMIN A WAS GIVEN)

No.	Initial Values		Final Values		Hypopyon Healing in Days	Healing Time in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level			
1	92	70	96	104	10	14	M
2	68	79	74	87	14	18	L
3	40	58	42	68	10	16	M
4	67	80	71	87	16	38	L
5	72	60	74	78	17	20	L
6	79	83	83	95	8	13	L
Average	69.66	71.66	73.3	86.3	12.5	20.16	—

TABLE 9

CLINICAL HYPOPYON ULCERS (NONCONTROL CASES IN WHICH VITAMIN A WAS ADMINISTERED)

No.	Initial Values		Final Values		Hypopyon Healing in Days	Healing Time in Days	Type of Scar
	Vit. A Level	Carotene Level	Vit. A Level	Carotene Level			
1	60	86	68	104	6	10	M
2	40	60	44	68	6	9	M
3	36	58	42	64	14	10	L
4	68	76	78	94	14	22	L
5	78	93	79	98	8	18	L
6	66	88	78	112	15	18	M
7	70	82	78	98	10	14	M
8	56	74	66	90	12	16	L
Average	56.75	77.12	66.6	90.5	10.62	14.62	—

TABLE 10

HEALING TIME IN NONSLOUGHING ULCERS IN DAYS

Cases	Minimum	Maximum	Average
Control	6	22	10.75
Noncontrol	6	14	8.66

TABLE 11

HEALING TIME IN SLOUGHING ULCERS IN DAYS

Cases	Minimum	Maximum	Average
Control	9	39	25.05
Noncontrol	9	29	15.7

TABLE 12

TYPE OF SCAR IN SLOUGHING ULCERS

Cases	Nebula	Macula	Leukoma
Control	—	36%	64%
Noncontrol	5.5%	55.5%	39%

TABLE 13

HYPOPYON RESORPTION TIME IN DAYS

Cases	Maximum	Minimum	Average
Control	17	8	12.5
Noncontrol	15	6	10.62

TABLE 14

HEALING TIME IN HYPOPYON ULCERS IN DAYS

Cases	Maximum	Minimum	Average
Control	38	13	20.16
Noncontrol	22	9	15.83

TABLE 15

SCARS IN HYPOPYON ULCERS

Cases	Nebula	Macula	Leukoma
Control	—	40%	60%
Noncontrol	—	50%	50%

which vitamin A was given was reduced and so was the density of scars.

2. *Sloughing ulcers.* The initial plasma levels in this group did indicate a small degree of hypovitaminosis. The final plasma levels were comparable to those of normal individuals. Both the healing time and the density of the scar were reduced in this group (tables 11 and 12) in cases in which vitamin A was given.

3. *Hypopyon ulcers.* The initial plasma levels were lowest in this group but the final plasma levels were comparable to those of normal individuals. The hypopyon resorption time, healing time, and the density of the scar were reduced in cases in which vitamin A was given (tables 13, 14, and 15).

DISCUSSION

In the experimental animals, it was observed that the final carotene levels showed a sharp decline. Mann, et al.[13] suggested that rabbits have an inherent capacity of rapidly converting carotene into vitamin A for utilization whenever needed. It is plausible that, for the healing of the corneal wounds in these animals, extra vitamin A was mobilized and was obtained by the rapid conversion of carotene.

The levels in man do not show any such decline in the carotene levels and it is felt that human beings do not have the power to convert rapidly the carotene stores into vitamin A. In human beings this conversion is a slow process and not of much clinical significance.

The final levels of vitamin A in experimental and clinical cases did not show any marked difference except in those in which there was an apparent hypovitaminosis in the beginning. There, too, the final levels of vitamin A were comparable to the normal. It has been suggested by Friedenwald and Buschke[4,5] that it is the deficiency of vitamin A which retards healing and they attribute the acceleration of the healing process to supplying this deficiency.

In the rabbits and also in our clinical cases in the nonsloughing ulcers, no deficiency of vitamin A was encountered. We, therefore, feel that vitamin A, by accelerating the metabolic processes of the cells,

actively helps in the healing mechanisms. The hypovitaminosis observed in severe types of clinical ulcers seems to result when the blood vitamin A (and its precursors) are mobilized in the emergency by the healing tissue. The return of these levels to normal in the control cases, in spite of the same diet, belies the concept of a real hypovitaminosis.

Scar formation appeared to be less in those cases in which extra amounts of vitamin A were administered. In what way vitamin A produces this result cannot be said with certainty.

Jonsson, et al.[10] stressed that vitamin-A deficiency causes a gradual disappearance of vitamin C from the blood. They also stated that the rat which is independent of exogenous ascorbic acid for its need loses its ability to synthesize vitamin C or to make use of dietary vitamin C when made completely deficient in vitamin A.

Horton[9] pointed out that vitamin A has a role in epithelial regeneration.

The lessening of the scar in our opinion is that, in the presence of extra amounts of vitamin A, there is better utilization of vitamin C. Vitamin A also plays a part in laying down collagenous material. Probably both factors work to an extent.

The acceleration in the hypopyon resorption time in the noncontrol cases of hypopyon ulcers suggests an anti-infection role of vitamin A.

Conclusion and Summary

1. Levels of plasma vitamin A and carotene among Indians were slightly lower than among normal individuals of Western countries.

2. Patients with corneal ulcers do not show any marked difference in their plasma vitamin-A levels from normal individuals.

3. Administration of vitamin A considerably shortens the average healing time of corneal wounds.

4. Vitamin-A administration helps to reduce the density of the scar.

Medical College.

Acknowledgments

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VISUAL DISTURBANCES FOLLOWING ACUTE BLOOD LOSS*

JOSEPH E. ALFANO, M.D., AND KENNETH L. ROPER, M.D.
Chicago, Illinois

INTRODUCTION

Reports of visual disturbances following loss of blood have been recorded in the medical literature since the time of Hippocrates. In a review of the medical literature from 1876, however, it was found that in none of these cases were the findings in the peripheral blood stream recorded, such as red blood-cell count, hemoglobin, hematocrit, bleeding, clotting, or prothrombin time. It is hoped that this report may stimulate publication of further cases with similar findings. Additional accounts will perhaps help to establish a critical level for blood hemoglobin or red blood cells, below which visual disturbances may be anticipated.

SOURCE OF THE HEMORRHAGE

Hemorrhages from many sources have been implicated: hematemesis, hemoptysis; miscarriages, abortions, childbirth, excessive menstruation; bloodletting, wounds of all types, amputations, and dental extractions.[1]

Bleeding from the gastrointestinal tract was found to be the most common cause, while uterine hemorrhages were close behind. In an analysis of 100 cases Wilbrand and Saenger[2] gave the following percentages: 41 percent gastrointestinal, 33 percent uterine, two percent bloodletting, eight percent nosebleeds, four percent wounds, one percent hemoptysis, one percent renal hemorrhages.

INCIDENCE OF VISUAL DISTURBANCES

The incidence is not common, as evidenced by the facts that in 60,000 cases of massive hemorrhage which came under his observation, Haab[3] detected no disturbance, and that Dufour[4] observed it in only one of 30,000 cases of massive hemorrhage. Harbridge[5] spoke of its infrequency after so common a condition as epistaxis.

The age incidence coincides with that period in life when conditions responsible for loss of blood are most prevalent. The greatest incidence appears to be in young adults and middle-aged persons, although its occurrence at both extremes of age have been reported.

Singer's[6] exhaustive analysis of the cases of visual disturbance appearing in the literature up to 1901 clearly demonstrated the great diversity of the ocular phenomena, and indicated that the pathogenesis is not the same in all cases. Singer found that 55 percent had occurred in females and 45 percent in males. This difference, however, may be physiologic.

The time of onset according to Terson[7] is as follows: 8.3 percent during the hemorrhage, 11.6 percent immediately after, 14.2 percent in the first 12 hours after the hemorrhage, 19.2 percent two days after the hemorrhage, 39.2 percent three to 16 days after the hemorrhage, 7.5 percent after 16 days. From this it would appear that most of the cases occur within the first week after the hemorrhage.

ETIOLOGY

On the basis of etiology, the terms surgical shock and medical shock, or more specifically hemorrhagic shock, wound shock, traumatic shock, and toxemic shock do not define different disorders nor do they suggest different mechanisms of induction. They merely designate circumstances which frequently eventuate in the development of a characteristic clinical picture. The specific factors which are responsible for the development of shock vary considerably in each of these designated types. We think it is understandable that surgical and wound shock do not differ basically from hemorrhagic shock.[8]

* From the Department of Ophthalmology, Illinois Central Hospital, Chicago, and Northwestern University Medical School. Presented at the April, 1954, meeting of the Pacific Coast Oto-Ophthalmological Society, Honolulu, Hawaii.

Whether the visual disorders which follow in the path of an anemia secondary to exsanguination are due to an infectious agent, anemia anoxia, or a toxic factor, as yet remains unsettled.

The absence of any inflammatory reaction on pathologic examinations would appear to rule out an infectious etiology.

It is well known that in hemorrhagic shock the resultant anemia leads to a reduction in nutrient flow to the body tissues with a subsequent anoxia.[9] In this manner toxic actions can be exerted upon these tissues through excessive production and accumulation of metabolic products and by changes which they produce in the cellular environment.[10]

The rarity of the condition, its frequently delayed onset, and the occasional unilaterality of some of the cases, have led not a few authors to feel that a toxic factor is implicated. The presence in some of the cases of a central scotoma indicating a retrobulbar neuropathy would seem to lend credence to this view.

Zentmayer[11] considers that since about 40 percent of the reported cases occur after gastrointestinal hemorrhage whereas only four percent of the recorded cases occur after loss of blood due to wounds (in spite of the frequency of battlefield injuries) to be of some etiologic significance. The better physical condition of the soldier, who is usually also younger in years, may be an important factor.

Still further evidence to support the belief in a toxic factor may be gained from a study of hemorrhagic shock in dogs.[12] It has been found that after single or repeated hemorrhages, there is an accumulation of deleterious principles such as histamine, H-substances, acetylcholine, bacterial products, adenosine compounds, kallikrein, potassium and ferritin (VDM), which in themselves may exert a deleterious effect upon tissues or may acquire toxic properties after reacting with other humoral agents, not excluding hormones and vitamins.

Pathology

Most authors are agreed that there is an edema of the ganglion cells and the nerve-fiber layer of the retina. The edema of the nerve fibers is usually limited to the area of the optic disc, with the area immediately adjacent to it, and the region just behind the lamina cribrosa. Goerlitz[13] was able to find nodules also in the nerve-fiber layer. The absence of any inflammatory reaction is particularly noticeable. He showed a focal demyelinization with subsequent gliosis, especially of the peripheral nerve fibers, only in the region of the lamina cribrosa. It is tempting to speculate whether the crowding of the nerve fibers as they enter the posterior scleral foramen is a contributing factor in this regard.

In dogs that had been bled to death by repeated exsanguinations, however, Holden[14] and Morrison[15] were able to demonstrate these areas of focal demyelinization from the region of the lamina cribrosa to the external geniculate body. No changes were found in the external geniculate body, the anterior corpora quadrigemina, or the cortical occipital visual areas.

In the case to be presented, necropsy revealed that the intracranial portion of the optic nerves, the optic chiasm, and the optic tracts up to the external geniculate body were normal. Unfortunately the eyes of this patient could not be obtained for post-mortem examination.

These photographs taken from Goerlitz,[13] who described the pathologic findings in the case of a 57-year-old white man who became totally blind from repeated bouts of hematemesis, demonstrate the pathologic process particularly well (figs. 1, 2, 3, 4, and 5).

In each eye there was edema of the optic disc and the adjacent nerve fibers with obliteration of the physiologic cup (fig. 1-a). There was no increase in the number of nuclei in the area of the nervehead. Even under weak magnification peculiar nodules were noted in the nerve-fiber layer, always

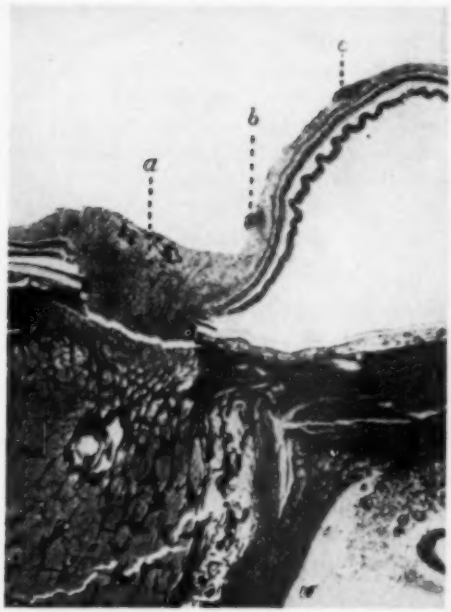

Fig. 1 (Alfano and Roper). (a) Showing edema of the optic disc and obliteration of the physiologic cups; (b, c) nodules in the nerve-fiber layer. Central vessels appear conspicuously wide but without change in their walls (Goerlitz[10]).

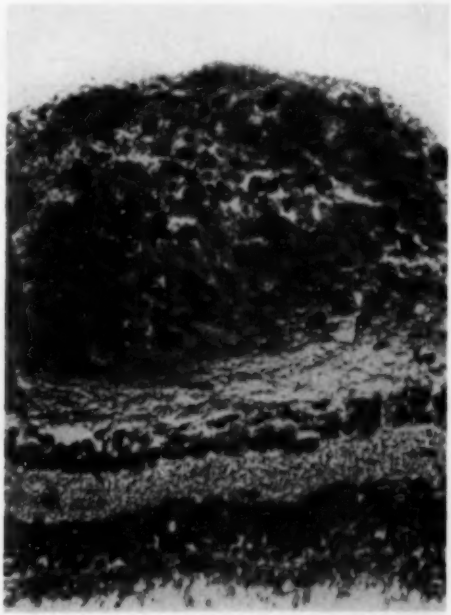

Fig. 2 (Alfano and Roper). Higher magnification of one of the nodules, all of which were located in the nerve fiber layer to the medial side of the disc. Weigert stain (Goerlitz[10]).

to the medial side of the disc (fig. 1-b and c). Goerlitz demonstrated these nodules with both Weigert's and van Gieson's stain. The central vessels appeared conspicuously wide but without changes in their walls.

Examination of the nodes under higher magnification (fig. 2) revealed that they were accumulations of peculiar structures—some round, some ovoid, and entirely limited to the nerve-fiber layer. Under still higher magnification (fig. 3), these structures were noted to have distinctly dark staining, eccentrically placed nuclei. There was no trace of

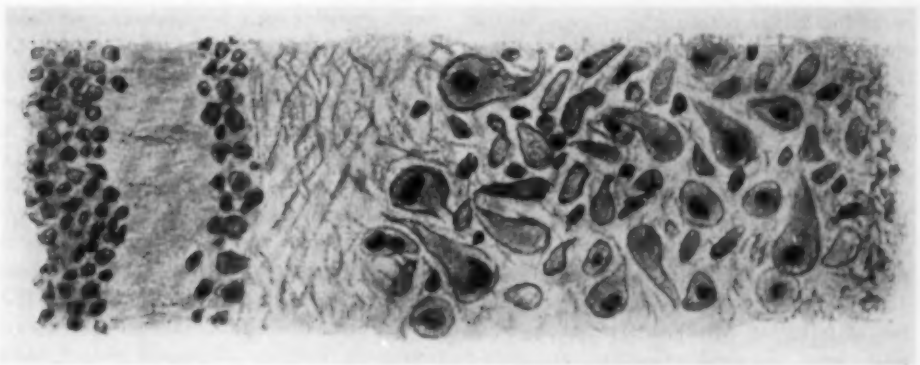

Fig. 3 (Alfano and Roper). Further study (schematic) of a nodule under still higher magnification. There is no evidence of an inflammatory reaction (Goerlitz[10]).

Fig. 4 (Alfano and Roper). (a) Circumscribed degenerative plaque seen immediately behind the cribriform plate wherein no medullary sheaths can be recognized. Occurring mainly toward the periphery of the nerve they seem to resemble the degenerative plaques of the optic nerve in multiple sclerosis. Weigert stain (Goerlitz[18]).

inflammation and no increase in the number of nuclei.

In addition to the changes noted in the optic disc and nerve-fiber layer, conspicuous changes were found in the optic nerve just behind the cribriform plate (fig. 4-a). Distinct, circumscribed, degenerative plaques, eccentrically located toward the periphery of the nerve, were demonstrated by Goerlitz with both Weigert's and van Gieson's stains. He felt they bore a close resemblance to the degenerative plaques of the optic nerve in multiple sclerosis. Under high magnification (fig. 5) not only degeneration of the medullary sheaths but of the interstitial tissue as well was observed. Goerlitz questioned whether or not there was proliferation of glial tissue as a consequence of the atrophy of the nerve fibers.

Goerlitz noted no other pathologic changes in the remainder of the eyes. The anterior parts were in no way involved and no changes in the walls of the retinal or optic nerve vessels were found.

Objective findings

Both Zentmayer[11] and Harbridge[5] have called attention to the fact that a very high percent of the cases are bilateral. Further survey of many of the cases reported in the literature[5, 11, 16–19] reveals the following interesting findings:

The pupils may be dilated and fixed, dilated with a sluggish reaction, or dilated with an almost normal reaction.

Ophthalmoscopically, three types may be differentiated:

In one type the fundus may appear normal.

In a second type, the ophthalmoscopic picture resembles that seen in quinine intoxication, in that the only abnormal findings are a pallor of the disc with a marked attenuation of the entire arterial tree.

In a third type, there is edema of the disc with some edema of the area of the retina adjacent to the disc and a few hemorrhages. The arteries may appear normal or pale and are usually not attenuated. The veins may be normal or may show slight engorgement. Small round hemorrhages and soft exudates, if present, are usually few in number.

The visual field defects described are multiple and varied, the most severe being a bilateral or unilateral loss.

The visual field defect usually reaches its maximum intensity rapidly, becoming complete in several hours or days. It seems to make no further progress unless additional hemorrhages occur. Generalized contraction of the fields and altitudinal defects are common, the inferior altitudinal defect being more frequent than the superior. The greater

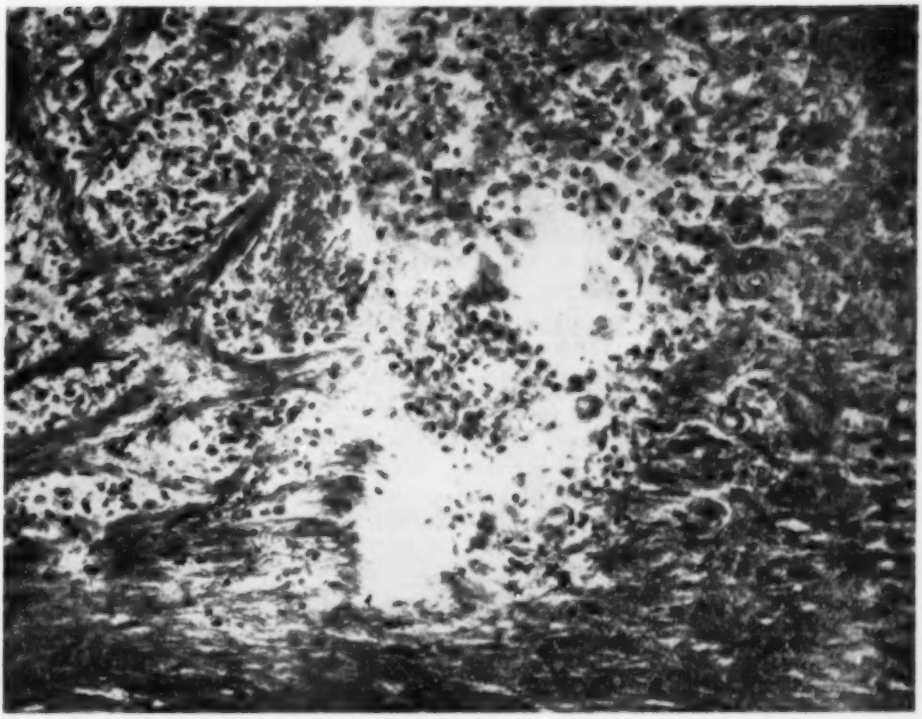

Fig. 5 (Alfano and Roper). Atrophic plaque under higher magnification. van Gieson's stain (Goerlitz[10]).

frequency of the inferior altitudinal defect is said to be due to the fact that gravitational effects leave the superior half of the retina more deficient in blood than the lower half. Central and paracentral scotomas, sector and hemianopic defects have been known to occur. The hemianopic defects are attributed to cerebral ischemia, which affects the optic pathways. A binasal defect has also been reported.

If improvement in the visual field is to take place, regression occurs only after a variable length of time. Unlike the development of the initial defect, regression is slow and irregular, producing small islands of vision surrounded by blind areas. Preferentially, regression commences in the lower field of vision.

Often associated with the visual disorders are cerebral symptoms, motor and sensory disturbances; frontal, occipital, or periorbital headaches; aphasia; amnesia; stupor; coma; nystagmus; polyneuritis; and oculomotor paresis.

Prognosis

Zentmayer[11] believes that if the visual disturbance occurs at the same time as the hemorrhage, improvement follows in 22 percent of the cases; if it occurs 12 hours after the hemorrhage, improvement follows in 71 percent of the cases; if between 12 hours and 10 days, improvement follows in 41.5 percent of the cases; and if after 10 days, improvement follows in 50 percent.

According to Singer[6] 46.4 percent of all cases show no improvement; 38.4 percent get better; 13.9 percent return to normal; and 1.3 percent get worse even though the hemorrhage ceases and the patient survives. When this is further broken down as to the

TABLE 1

VISUAL IMPROVEMENT AFTER BLOOD LOSS

Source of Hemorrhage	No. of Cases	No Improvement (percent)	Some Improvement (percent)	Return to Normal (percent)
Intestinal	55	51	40	9
Uterine	50	42	46	12
Epistaxis	8	63	12	25
Bloodletting	25	48	32	20

cause of each hemorrhage, he submits the data in Table 1.

The figures of Fries,[20] who analyzed 106 cases from varied causes, closely resemble Singer's.[6] He shows that 50 percent terminate in complete optic atrophy, 30 percent show some improvement, and 20 percent return to normal.

DIFFERENTIAL DIAGNOSIS

In any case a differential diagnosis should include studies to rule out glaucoma, tobacco-alcohol amblyopia, methyl-alcohol poisoning, luetic optic atrophy, multiple sclerosis, quinine intoxication, hysterical amblyopia, and cerebral neoplasm.

CASE REPORT

A 65-year-old white man was admitted to the hospital in a semistuporous condition. Five months previously he had had a resection of the terminal ileum, caecum, and right colon for rectal bleeding, which, upon pathologic examination, showed a nonspecific granulomatous reaction.

Three days prior to admission, he had had a massive hemorrhage from the bowel and nose. After this hemorrhage he stated he lost his vision overnight—that everything was covered with a haze, especially electric lights.

At the time of admission, visual acuity with correction was hand movements, right eye, and counting figers at two feet, left eye. The pupil of the right eye measured 4.0 mm. and that of the left 3.5 mm. The direct and consensual reaction to light was almost nil. The intraocular pressure was 10 mm. Hg (Schiøtz), right eye; 10 mm. Hg, left eye.

Ophthalmoscopic examination of the right eye revealed the media to be clear, the disc only slightly pale but not edematous. The arterial light reflex was pale. Attenuation of the arteries was minimal. There were moderate arteriovenous crossing defects. The veins showed only slight engorgement.

Although there was some edema and there were folds in the macular area, no cherry-red spot was present. Scattered throughout the entire fundus were multiple, small, round hemorrhages. Gentle pressure upon the superior portion of the globe caused a complete collapse of the central retinal artery as it emerged from the optic disc.

Examination of the left fundus revealed similar conditions. Because of his critical condition only confrontation fields were done. They suggested a generalized contraction.

Laboratory studies at the time of admission revealed a hemoglobin of 3.7 gm. (equivalent to 25 percent of normal), red blood cells 400,000, white blood cells 5,750, hematocrit 11 percent, bleeding time six minutes and 20 seconds, coagulation time five minutes and 50 seconds, prothrombin time 95 percent, Kahn and Wassermann tests negative, blood sugar normal, total proteins 9.7, albumin 2, and globulin 7.7.

While X-ray studies of the skull showed osteolytic areas in the frontal, parietal, and occipital bones, they proved the pituitary fossa, both orbits, optic foramina, and sphenoidal ridges to be normal. No calcification of the carotid arteries was seen in either the skull or the neck.

Biopsy of a lymph node taken later established a diagnosis of lymphoblastoma.

The patient received the usual therapeutic measures, including whole blood, vitamins, iron, and folic acid.

After the 12th day of hospitalization, the patient's condition had improved enough to permit visual field studies to be made. These showed a generalized contraction in both eyes to a 3/330 white test object. Central

fields showed a 10-degree central scotoma to a 5/1,000 white test object in each eye. Two weeks later the visual fields were unchanged.

The patient remained in the hospital for a period of two months, during which time he was examined at frequent intervals. During this time the visual acuity improved to 20/200 in each eye; the pupillary size and reaction to light remained the same, although under the stronger illumination of the slit-lamp, the pupil showed some reaction.

Peripheral fields showed generalized contraction to a 1/330 white test object. Superior altitudinal defects to a 5/1,000 white test object had developed in the central field of each eye. There was no significant change in the appearance of the optic disc or of the arteries and veins.

The edema of the macular areas began to clear by his 17th day in the hospital, and by the time of his discharge, two months later, had been completely absorbed. Only a few of the hemorrhages absorbed during his stay in the hospital. Peripheral and central fields remained unchanged. At the time of his discharge, the red cell count was 1,110,000 and the hemoglobin was 7.5 gm., or 52 percent of normal.

Examination four weeks after discharge from the hospital showed the visual acuity to be 20/200 in each eye, and it could not be improved. The pupillary size was the same but the reaction to light seemed to have improved somewhat. Intraocular pressure was 15 mm. Hg (Schiøtz) in each eye.

The pallor of the discs was now more pronounced, the arterial tree was obviously diffusely attenuated with a pale light reflex, and the slight engorgement of the veins was still present. Except for a few scattered ones, hemorrhages had been completely absorbed. No edema or cherry-red spot was seen in the macular area.

The fundus picture was now not unlike that seen in quinine intoxication. Gentle pressure upon the globes still produced complete collapse of the central retinal artery. Visual fields showed no change.

Three weeks later while at home the patient had another severe gastrointestinal hemorrhage and died shortly after his arrival at the hospital.

Summary

The source, incidence, suggested etiology, pathology, signs and symptoms, and visual field disorders seen following acute exsanguination have been presented. A case was reported wherein hemorrhages from the bowel and nose associated with a marked reduction in red blood cells and hemoglobin produced a marked visual loss associated with changes in the fundi and visual fields. Pathologic examination of the intracranial portion of the optic nerves, the optic chiasm, and optic tracts proved them to be normal.

303 East Chicago Avenue (11).

55 East Washington Street (2).

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EPIPHORA: ITS CAUSES AND NEW SURGICAL PROCEDURES FOR ITS CURE*

A PRELIMINARY REPORT

LESTER T. JONES, M.D.
Portland, Oregon

The busy ophthalmologist often gives too little attention to the patient complaining of epiphora. But to the patient, epiphora may be a major disability. There is the constant annoyance of wiping his eyes. He is embarrassed socially when others think his tears denote an emotional disturbance. The tearing may be an industrial hazard or make employment hard to obtain. His safety as a driver decreases. The wearing of glasses adds to his handicap. For these and other reasons he anxiously seeks relief.

The following discussion is presented to encourage the ophthalmologist in his efforts to aid patients with this condition. Only a small percent are incurable.

ANATOMIC STRUCTURES INVOLVED IN EPIPHORA

Clinical and anatomic studies led me to the observation that the mechanism responsible for carrying fluid from the eye is what I term the "lacrimal pump." It consists of three parts: (1) The "lacrimal diaphragm," (2) the lower leg of Horner's muscle, and (3) the lower eyelid.

1. *The lacrimal diaphragm* bridges over the open face of the lacrimal fossa and converts it into a closed cavity except for its nasal outlet below. This diaphragm is made up of a strong layer of fascia, which is an extension of the orbital periosteum, and the reflex part of the medial palpebral ligament. Its movement creates either a negative or a positive pressure in the tear sac.

2. *Horner's muscle* is the lacrimal head of the palpebral part of the orbicularis oculi muscle. It arises from the posterior lacrimal crest and lacrimal diaphragm and extends to each lid. In the region above and below the puncta it is joined by the superficial head of the palpebral muscle which arises from the medial palpebral ligament and the bony orbital margin adjacent to it. The lower leg of Horner's muscle crosses the tear sac in a horizontal direction while the upper leg travels anteriosuperiorly, crossing only the posterior part of the fundus of the sac.

* Read at the meeting of the Oregon Academy of Ophthalmology and Otolaryngology, September 15, 1953, Portland, Oregon.

3. *The lower lid,* unlike the upper lid, is pulled sharply toward the nose two or three mm. in the act of blinking. Its medial end lies in the apex of a triangle, the two adjacent legs of which are the two heads of the lower palpebral muscle and the base of which is the lacrimal bone. When the muscle contracts the lid is drawn like the plunger in a syringe toward the lacrimal diaphragm.

Schaeffer[1] stated "the upper lacrimal duct is eight-mm. long and the lower 10 mm. They are about 0.1 mm. to 0.2 mm. in diameter at the puncta, 1.0 mm. at the ampulla, and 0.5 to 0.8 mm. in the horizontal part.

"The horizontal portions communicate with the lacrimal sac in varying ways: (a) The ducts may unite into a short narrow common duct and this in turn establishes communication with the sac (usual way); (b) the ducts may empty separately into an apparent diverticulum of the sac, the superior sinus (Maier); (c) the ducts rarely empty separately. The orifice of the common duct is usually two to five mm. below the top of the sac on its dorsolateral aspect."

Stallard[2] observed that "the first four to five mm. of the lacrimal ducts are subconjunctival, two mm. below the margin of the lid. They then penetrate Horner's muscle and the reflex part of the medial palpebral ligament and (lateral) lacrimal fascia."

The sac extends above the level of the medial palpebral ligament about three mm. It is estimated that from two thirds to three fourths of the lacrimal fluid is carried by the inferior lacrimal duct.

Treatment of Epiphora

Treatment of both congenital and acquired epiphora secondary to obstruction of the nasolacrimal duct has become well standardized. It is so successful one can make the categorical statement that a surgeon is now almost never justified in extirpating the tear sac. Therefore, the discussion here will be limited to treatment of epiphora from other causes.

Conservative Methods

When a patient is first examined, it must be determined what causes the epiphora. Eye strain, allergy, foreign bodies, ocular disease, blepharitis, trichiasis, and many other conditions must be looked for. The position and patency of the puncta are observed.

A "canaliculus test" is made. If the saline solution injected into the inferior lacrimal duct returns through the superior duct instead of through the nose the test is "positive." If the fluid returns through the inferior duct only, the test is "negative."

If dilatation of the punctum fails repeatedly, as is often the case in spastic occlusion, a vertical cut, two-mm. long, is made in the conjunctival side of the horizontal part of the duct. An everted punctum is replaced either by the Ziegler cautery or the Stallard method of excising an elliptical piece of conjunctiva.

Strictures of the lacrimal ducts are repeatedly stretched with Bowman probes ranging in size from 00 to 2. I have found Pischel's method of instructing the patient how to pass a No. 1 Bowman probe daily to be helpful.[3] If the stricture is resistant or bleeds after probing, the ducts may be threaded with dermal. I have also threaded the lacrimal ducts with 22-gauge polyethylene tubing, as described by Veirs,[4] but with poor results and much discomfort to the patient.

Slitting the Canaliculi

Up to a quarter of a century ago, slitting the canaliculi was universally practiced in the treatment of epiphora. So widespread has been its condemnation since then that sight has been lost of the fact that it works well if the proper indications are present and the patient has a good sac and nasolacrimal duct.

I have nine patients who, after further operation have both clinical relief and a positive dye test (that is, fluorescein solution dropped in the conjunctival sac appears in the nose within two to five minutes). If all

of these patients had had the correct operation at first, the slitting would have been unnecessary. One patient had had a previous dacryocystectomy which was cured by canaliculorhinostomy, one was cured by dilatation of a stricture between the slit and the tear sac, seven were cured by dacryocystorhinostomy.

Case report

Mr. J. C., aged 18 years, while working at a forge, got a piece of molten metal in the nasal side of his right eye. The lateral third of each lacrimal duct was completely destroyed. His epiphora was so annoying that about two months later surgical relief was attempted.

A vertical incision was made just nasal to the scar in the lower lid margin. The duct was found, and a slit five-mm. long was made between it and the upper, inner lid margin.

The patient had complete relief except under conditions causing excessive lacrimation.

Both Henderson[5] and Veirs[4] have reported restoration of lacrimal ducts, that have been partially or completely destroyed, by making a new canal with a needle or knife and threading it with polyethylene tubing. I have tried this method on several patients and have seen it used on others. In these instances the results have been not only discouraging but extremely disagreeable to the patients.

In cases in which the lateral end of the lacrimal duct is obliterated or in which a stricture there fails to respond to other treatment, slitting the duct should give a much higher percentage of cures.

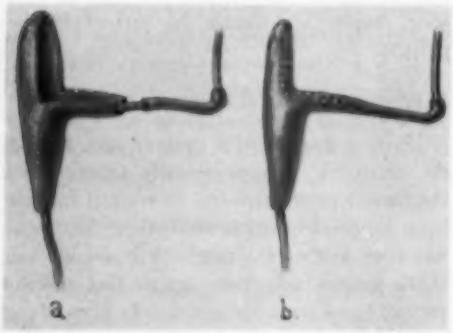

Fig. 1 (Jones). *Canaliculodacryocystostomy.* (a) A No. 22 gauge polyethylene tube is threaded through the patent lateral part of the canaliculus and over the lateral half of the tear sac and down through the nasolacrimal duct. (b) The tear sac flaps are sewed shut and sutured to the canaliculus.

CANALICULODACRYOCYSTOSTOMY (fig. 1)

Strictures in the region of the internal common punctum which cannot be probed or a lacrimal duct in which the nasal end has been destroyed present a different problem. In treating these I have used a Wheeler needle-knife, passing it along the duct and then cutting through the obstruction until the sac was reached. This was followed by threading the duct or introducing polyethylene tubing.

A certain percentage, probably less than 50 percent, can be cured in this way. I have devised a method of using the fundus of the sac as a flap to create a new duct.

Case report

R. S., aged 11 years, while playing fell on a stick which passed through the tissue lateral to the right tear sac.

Examination three months later showed that two to three mm. of the nasal end of each lacrimal duct had been destroyed.

At operation the usual external tear-sac incision was made. The occluded end of the inferior lacrimal duct was dissected free and a five-mm. wide flap was made from the upper half of the lateral wall of the tear sac. This was sutured to the dissected end of the lacrimal duct with 6-0 mild chromic gut.

A 22-gauge polyethylene tube was next inserted through the lacrimal duct, sac, and nasolacrimal duct. More sutures were then placed between the top of the flap and the end of the lacrimal duct, thus converting the flap into a tube surrounding the polyethylene tubing.

The opening in the tear sac was closed by suturing the nasal wall of the sac to the sides and base of the newly created duct. The skin was closed with a black silk subcuticular suture.

Seven days later the polyethylene tubing was accidentally removed. Fortunately, it was possible to rethread the passage with three medium dermal threads which were left in place another two weeks.

A slight stricture developed—not at the anastomosis but at the base of the flap. This has disappeared with repeated probing. Five months after the operation the dye test was positive and the patient said he had no epiphora.

Textbooks describe various methods of creating a new section of lacrimal duct, such as the use of a section of vein or a piece of tubing around which conjunctiva or buccal mucosa has been sewed. The method herein described would seem to have the advantages of better blood supply, similarity of epithelium, less tendency to postoperative shinkage, and simple execution.

CONJUNCTIVODACRYOCYSTOSTOMY (figs. 2 and 3)

Epiphora caused by obliteration of both ducts is fortunately rare. I have recently seen two women who had this condition in both eyes. Stallard's[2] method of transplanting the tear sac to the lower conjunctival cul-de-sac has become the accepted procedure.

I have done this operation on two patients. It was not difficult and both obtained good surgical results. A Ziegler No. 4 probe can be passed easily into the nostril of each patient, and each can blow air from the nose into the conjunctival sac. But the dye tests have been persistently negative and there is little relief from the epiphora.

The probable reason for the failure is that the use of the lacrimal pump has been lost. The transplantation places the sac lateral to Horner's muscle so that compression is no longer possible. The following procedure was used for patients seen subsequently:

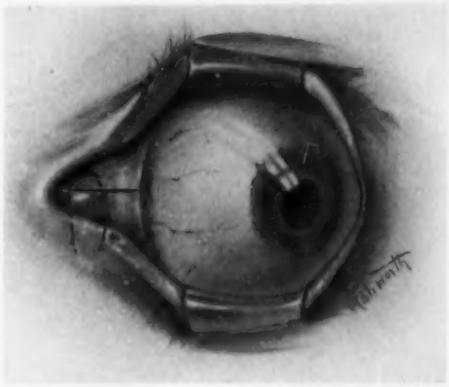

Fig. 2 (Jones). *Conjunctivodacryocystostomy.* The dotted line represents the approximate position of the tear sac. The continuous line is the conjunctival incision extending from the medial canthus to the plica semilunaris.

Case report

Mrs. I. M., aged 45 years, had obliteration of all four lacrimal ducts. A Stallard transplantation of the sac had been done on the right side in November, 1952, without relief.

On March 13, 1953, the left side was operated on. A horizontal incision, about 10-mm. long, was made from the junction of the lids at the medial canthus to the margin

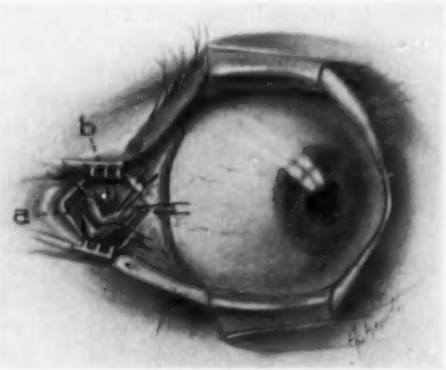

Fig. 3 (Jones). *Conjunctivodacryocystostomy.* (a) The medial half of the fundus of the tear sac. (b) Horner's muscle.

Fig. 4 (Jones). *Conjunctivorhinostomy.* (a) The nasal mucosal flap. Insert shows the flap (a) elevated and turned aside to show (b) the bony ostium made through the lacrimal fossa.

of the plica semilunaris conjunctivae. The conjunctiva was undermined and then retracted with a small Mueller tear-sac speculum, exposing the entire region of the lacrimal fossa. Immediately posterior to the medial palpebral ligament the periorbital fascia and reflex part of the medial palpebral ligament were incised, the knife being carried about seven mm. down along the anterior lacrimal crest.

With a periosteal elevator and scissors, the fundus of the sac was dissected free from the lacrimal bone, and a few of the upper fibers of origin of Horner's muscle were separated from the superior part of the posterior lacrimal crest to mobilize the top of the sac. No effort was made to free the lower part of the lateral wall of the sac from the lacrimal diaphragm for fear of injuring Horner's muscle.

The upper half of the tear sac was next split anteroposteriorly so that the lateral wall could be used as a flap, the apex of which was sutured into the lateral end of the conjunctival incision. The margins of the conjunctival incision were then sutured to the tear-sac flap with 6-0 mild chromic gut. In like manner, sutures were taken between the nasal half of the tear sac and the medial end of the conjunctival incision.

A vaseline gauze pack, consisting of two or three strips of umbilical tape, was pulled into the opened sac by a strand of dermal which extended through the sac, nasolacrimal duct, and nose. The pack was removed in about 10 days, and the ostium was dilated occasionally with probes from the size of a Bowman No. 6 to a Ziegler No. 4.

In this and one other patient, operated on two months later, the epiphora has been relieved and the dye test is positive. For similar cases, Roycroft,[6] in 1949, suggested the use of an "intermarginal" incision into the tear sac which was held open by a Tiersch graft or a strip of conjunctiva.

Canaliculorhinostomy

Surgical relief of epiphora resulting from an obliterated or nearly obliterated tear sac has been described by Arruga[7] and Waldapfel.[8] They sutured the mucosa adjacent to the nasal end of the lacrimal ducts to the nasal mucosa. This requires an external approach to the lacrimal fossa.

In their series of 144 patients with epiphora, Jones and Boyden[9] have had 10 with obliterated tear sacs, all of whom had the usual intranasal tear-sac operation. All of the 10 patients have been followed from one to seven years. Two have had unsatisfactory results. In both, the lacrimal ducts could probably be reopened if the patients were available for further treatment.

Conjunctivorhinostomy (figs. 4, 5, and 6)

Epiphora following traumatic or surgical destruction of the sac is probably the most difficult of all to cure. Stallard[2] described a method of connecting the nasal cavity with the conjunctival sac. In this method a section of a fairly large vein or a tube of inverted buccal mucosa covering a piece of polyethylene tubing is sutured into an opening made inferior and posterior to the attachment of the medial palpebral ligament. These

both have a tendency to close and must be dilated and probed over a long period of time.

Dr. Guy A. Boyden, of the Department of Otolaryngology of the University of Oregon Medical School, and I devised a procedure utilizing a pedicled flap of nasal mucosa to line the surgical ostium. It has definite advantages over methods so far proposed.

Case report

Mr. H. B., aged 35 years, had had a dacyrocystectomy 17 years before and had subsequently gone to many specialists for relief of a distressing epiphora.

At operation, under general anesthesia, the first step was to make an incision parallel to the upper fibers of the lower leg of Horner's muscle. Beginning two-mm. inferior and nasal to the punctum of the lower lid on the conjunctival side, the incision was extended posteriorly about 12 mm. to the region of the posterior lacrimal crest. The knife was carried down to the bone and the soft tissue was elevated from the entire region of the lacrimal fossa.

The next step was to prepare the nasal flap. Intranasally, an incision was begun at the anterior attachment of the middle concha and was carried upward about 10 mm., nearly to the bridge of the nose. The knife

Fig. 5 (Jones). *Conjunctivorhinostomy.* The nasal mucosal flap (a) has been rolled back to form an epithelial-lined tube. Insert shows the tube has been turned up and pushed through the bony ostium.

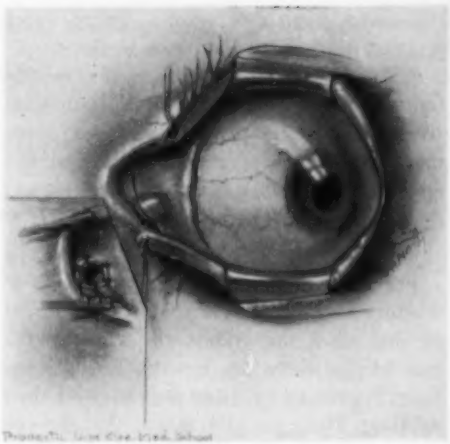

Fig. 6 (Jones). *Conjunctivorhinostomy.* The conjunctival incision extends from a point two mm. below and nasal to the punctum and then proceeds backward, parallel to the upper border of Horner's muscle. Insert shows the nasal mucosal tube sutured to the conjunctiva.

was then turned at right angles and the incision was extended for about 20 mm. downward and forward, parallel to the bridge. Then, at right angles to this, for about seven mm. the incision was continued downward and posteriorly toward the anterior attachment of the inferior concha. The last part of the flap was formed by carrying the knife for about 10 mm., again at right angles, posteriorly and superiorly, parallel with the bridge. The resulting flap was roughly like an inverted capital "L."

The flap was then elevated and the intervening bone, between the anterior and posterior lacrimal crests, was removed with chisel and bone forceps. The anterior superior corner of the flap was sutured with 6-0 mild chromic gut to the conjunctiva at the posterior end of the external incision. The anterior inferior corner of the nasal flap was turned up and sutured opposite this with the periosteal side out.

Interrupted sutures were then placed between the rest of the conjunctival and nasal mucosal margins, thus making a completely epithelial-lined ostium. This was packed with

one-fourth inch wide vaseline gauze which was left in place for about two weeks.

A Ziegler No. 4 probe was used at weekly intervals for about two months postoperatively. When the patient was seen seven months after his operation he said he had epiphora only occasionally. The dye test was positive.

Comment

For about a century a controversy as to whether the tear sac is compressed or expanded when the eyelids close in blinking has existed between investigators. Duke-Elder[10] gave an excellent summary of their opinions. His own opinion was that the evidence favors compression of the sac. Postoperative observations of intranasal windows lead to the belief that Whitnall[11] was right, that is, that the sac expands in the act of blinking.

In light of the results cited, the question would seem to be of academic interest primarily. The flow of lacrimal fluid toward the nose is not entirely dependent on negative pressure in the tear sac as the surgical window always destroys this factor. Nor is it entirely dependent on shortening and compression of the lacrimal ducts in winking. The irreducible minimum seems to be an active lower leg of Horner's muscle and a passage medial to it that connects the conjunctival sac with the nasal cavity.

It is hoped this paper will be considered primarily as a preliminary report for there are not enough cases to warrant any deductions as to the percentage of cures by some of the surgical procedures which have been presented.

Summary

It is suggested that: (1) The periorbita covering the lacrimal fossa together with the reflex part of the medial palpebral ligament be called the "lacrimal diaphragm"; (2) the lacrimal diaphragm together with the lower leg of Horner's muscle and the lower lid be known as the "lacrimal pump."

Conservative measures for the cure of epiphora are discussed.

Slitting the canaliculus medial to the obstruction is recommended when other methods fail to restore the lateral part of the duct.

Four procedures are proposed and described:

1. *Canaliculodacryocystostomy* utilizing the lateral half of the tear sac as a tubular flap when there is destruction of the nasal end of a canaliculus.

2. *Conjunctivodacryocystostomy* formed by suturing the opened fundus of the sac to the conjunctiva when the canaliculi are absent.

3. *Canaliculorhinostomy* when the tear sac is absent but the canaliculi are of normal length.

4. *A pedicled flap of nasal mucosa* to line the ostium when conjunctivorhinostomy is required.

Medical Arts Building (5).

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CYCLOPENTOLATE HYDROCHLORIDE: A NEW MYDRIATIC AND CYCLOPLEGIC AGENT

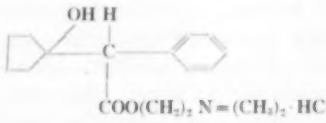
A PHARMACOLOGIC AND CLINICAL EVALUATION

DAN M. GORDON, M.D., AND MELVIN H. EHRENBERG, PH.D.
New York

In 1952, Treves and Testa[1] reported on the synthesis and activity of a group of new antispasmodic and mydriatic agents. A complete study of the pharmacologic activities of this series of compounds was reported by Ehrenberg, et al.,[2] shortly thereafter.

One compound, B-dimethylaminoethyl (1-hydroxycyclopentyl) phenyl acetate hydrochloride,* exhibited properties such as maximal mydriasis in the face of intense light, and rapid recovery without local side effects, which merited a pharmacologic and clinical study of its function as a mydriatic and cycloplegic agent.

Cyclopentolate hydrochloride is a white crystalline, water-soluble ester with a melting point of 139°C. It has the following structural formula:



PHARMACOLOGIC DATA

OCULAR EFFECT: MYDRIASIS

The mydriatic action of cyclopentolate hydrochloride was studied in unanesthetized albino rabbits. All solutions were made with distilled water, borate buffer, or saline, and instilled directly into the conjunctival sac. Two drops of each solution tested were used. The eye was held closed and the lacrimal duct occluded by pressure for one minute following instillation. The size of the pupil was measured before and after instillation, at regular intervals, under direct illumination, and compared with the control eye in the same animal. Repeated applications at regular intervals exhibited no evidence of acquired sensitivity to the compound.

A total of 17 albino rabbits was used with a 96-hour interval permitted to elapse prior to reuse of the same animal. A minimum of seven observations was made for each test agent at each concentration. In Table 1, the top figure represents the average result with the standard deviation, while the figures in parentheses represent the spread of data.

The eyes were studied by a modification of the method described by Friedenwald, Hughes, and Hermann, as described by Draize, Woodward, and Calvery,[3] to determine if there were any injurious effects due to the drug. Especial search was directed toward injuries to the cornea, conjunctiva, palpebral mucosa, and iris. In testing, 0.1 ml. of material was instilled into the conjunctival sac of the rabbit eye, and the eye then held closed for one minute.

Observations were made at one, 24, 48, and 96 hours after instillation. Of the 33 experimental animals studied, only two demonstrated a mild transitory conjunctival injection which disappeared within 24 hours.

* Identical with cyclopentolate hydrochloride (75GT)—generic name for Cyclogyl distributed by Schieffelin & Company, New York. (J.A.M.A., 153:801, 1953.)

TABLE 1

MYDRIATIC EFFECT OF CYCLOGYL IN ALBINO RABBITS*

Compound	Time to Onset of Mydriasis (in minutes)	Time to Maximal Effect (in minutes)	Duration of Mydriatic Effect (in minutes)	Average Pupillary Diameter (in mm.)	Time of Loss of Pupillary Reflex (in minutes)	Duration of Loss of Pupillary Reflex (in minutes)
Cyclogyl 0.5%	4.0 ± 0.141 (3–5)	8.50 ± 0.748 (6–10)	240.5 ± 18.84 (209–287)	8.0 (7.5–8.5)	9.33 ± 0.361 (8–10)	77.5 ± 12.45 (60–116)
Cyclogyl 1.0%	3.1 ± 0.441 (2–4)	7.50 ± 0.70 (5–9)	250.5 ± 22.29 (246–300)	8.8 (8.5–9.0)	7.50 ± 0.547 (6–9)	92 ± 12.56 (73–119)
Atropine 0.5%	7.3 ± 0.457 (7–8)	14.6 ± 0.804 (13–16)	960 ± 48.70 (780–1080)	8.5 (8.0–9.0)	12.0 ± 0.464 (11–13)	88 ± 12.18 (68–130)
Atropine 1.0%	6.3 ± 0.340 (6–7)	12.0 ± 0.784 (10–13)	3600 ± 114.4 (3360–3720)	8.8 (8.5–9.0)	11.0 ± 0.371 (10–13)	134 ± 13.04 68–200)

* A minimum of seven animals were used for each determination.
The top figure represents the mean result with the standard deviation, and the figures in parentheses represent the spread of data.

No other evidence of irritation was observed with the use of 0.5 percent or 1.0 percent of cyclopentolate solutions.

To elucidate the mechanism of action of cyclopentolate, eight albino rabbits weighing approximately three kg. each were anesthetized with sodium pentobarbital, 35 mg. per kg. intraperitoneally, and the oculomotor nerve and cervical sympathetic fibers were isolated for electric stimulation with shielded glass electrodes. Cyclopentolate (one percent) was applied topically to the test eye, and mydriasis followed.

Upon electric stimulation of the cervical sympathetic fibers the mydriasis increased by an average of 0.5 mm., which indicated the action of the compound at the sphincter. On the other hand, electric stimulation of the oculomotor nerve following cyclopentolate mydriasis did not evoke any further response from the pupil, which indicated a paralysis of the sphincter muscle.

The administration of epinephrine, which stimulates the dilator fibers directly, further increased the mydriasis produced by cyclopentolate (less than 0.5 mm.), while the administration of atropine, which acts on the sphincter, was without effect.

Although these observations do not preclude completely the possibility that an effect is exerted on the dilator muscle, they point to a predominant action of the compound on the sphincter.

The freshly excised rabbit eye responds to topically administered cyclopentolate, indicating a peripheral action. The slight dilatation, approximately 0.5 mm., differs appreciably from that following death, which reaches maximal (8.5 to 9.0 mm.) pupillary size within five or 10 minutes.

The pupillary effects of cyclopentolate are manifested following both local and systemic administration. A rapid bilateral action is noted after systemic administration, whereas, topically the effect is confined to the test eye.

Our experimental evidence indicates that this drug produces mydriasis by paralysis of the iris sphincter. The in vivo action is predominantly anticholinergic, peripherally, with the possible site of action at the myoneural junction, or at the motor end-plate. To substantiate this hypothesis the following evidence may be cited: slight or no effect exerted by the compound on the dilator fibers of the iris, diminished reactivity of the iris sphincter to electric stimulation of the oculomotor nerve, and the response of the excised eye to the drug.

OTHER PHARMACOLOGIC ACTIONS

A detailed report on the general systemic action of cyclopentolate has been published

elsewhere by Ehrenberg, et al.[2] This investigation determined the activity of the compound on isolated rabbit intestinal strips, cat intestinal tract in situ, salivation, circulation and blood pressure, and its toxicity. These studies demonstrated that cyclopentolate possessed an antispasmodic potency approximately equivalent to one half that of atropine, slight inhibitory effect on salivary flow, circulation, respiration, blood pressure, and a very low toxicity. The compound did not exert any effect on the central nervous system during these experiments.

Clinical data

The cycloplegic and mydriatic properties of cyclopentolate were reported in a combined total of 1,035 cases by Priestley and Medine,[4] Stolzar,[5] Gettes and Leopold,[6] Abraham,[7] Ehrlich,[8] Lebensohn,[9] Posey,[10] and Milder and Riffenburgh.[11]

All patients were classified according to age, color, and sex. Essentially the same techniques for determination of depth and duration of mydriasis and cycloplegia were used by all investigators making for uniformity in evaluating their results. Cyclopentolate was used at a concentration of 0.5 percent and 1.0 percent in a boric acid-borate buffer of approximately pH 6.0 with 1:10,000 benzalkonium chloride (Zephiran) added as a preservative.

In Caucasians, two drops of 0.5-percent cyclopentolate instilled into each eye, one drop followed by a second drop five minutes later, produced complete mydriasis in approximately 30 minutes. Priestley and Medine,[4] and Abraham,[7] found the average pupillary size to be 7.0 mm. 30 minutes after instillation.

Homatropine (two percent), similarly used, produced an average pupillary size of 6.10 mm. In the cyclopentolate-treated group recovery occurred spontaneously within 20 hours, and within six hours after the use of one-percent pilocarpine. Spontaneous recovery in the homatropine group was complete within 48 hours.

In Negroes, a 0.5-percent cyclopentolate solution produced a 7.0 mm. pupil in 60 minutes. It is well known that heavily pigmented irises, as well as those of older individuals, react very slowly to mydriatic and cycloplegic compounds (table 2).

Maximal cycloplegia resulted within 30 to 60 minutes following the instillation of two drops of 0.5-percent cyclopentolate, one drop followed by a second drop five minutes later. It was common practice to measure the residual accommodation one hour after cyclopentolate administration and compare it with the residual accommodation resulting from the use of two or four-percent homatropine, or four-percent homatropine in one-percent paredrine solution. The average residual accommodation after use of 0.5-percent cyclopentolate was 1.10 diopters, whereas with homatropine four-percent it was 2.00 diopters.

Recovery from the cycloplegic effect in the cyclopentolate group occurred within 24 hours. Complete disappearance of these effects was evident within six hours after the use of one-percent pilocarpine. Homatropine (four-percent) and four-percent homatropine in one-percent paredrine afforded recovery within 48 hours.

As is to be expected with a new medication the various investigators have employed differing dosage routines in children, ranging from a 24-hour period of administration, two drops of 0.5-percent cyclopentolate during the evening prior to refraction followed by two drops next morning on the day of refraction, to a period of 30 to 60 minutes before refraction, two drops of 0.5-percent cyclopentolate five minutes apart with the examination in 60 minutes. The shorter period has proved satisfactory.

As will be pointed out in the discussion there is a much greater leeway in cycloplegia than has been recognized previously. Either method is more efficient in producing cycloplegia than reliance upon the mother in using atropine at home. When the mother has utilized a cycloplegic at home and brought

TABLE 2

MYDRIATIC EFFECT OF CYCLOGYL: AVERAGE OF RESULTS

(1,035 patients)

Compound	Dosage and Administration (drops)*	Pupil size (in mm.)	Time (in minutes)	Spontaneous Recovery (in hr.)	Local or Systemic Toxicity
Cyclogyl (0.5%)	2	7.0	30	20†	None
Homatropine (2.0%)	2	6.10	30	48	None
Cyclogyl (0.5%) Negroes	2	7.0	60	24†	None

* Two successive drops at five-minute intervals.

† Recovery time reduced to six hours after one-percent pilocarpine.

the child in with poorly dilated pupils, the additional use of cyclopentolate in the office is a time-saving procedure.

Cyclopentolate has proved useful as an aid in fundus photography because of its rapid and intense cycloplegic action. One of us (D. M. G.) does fundus photography and has found homatropine an inefficient cycloplegic in young children in the face of the intense light produced by the carbon arc which is the source of illumination in the fundus camera. In this same age group, roughly under 12 years, cyclopentolate has proved satisfactory without the attendant inconvenience necessitated by the use of atropine.

Cyclopentolate (0.5-percent) has been found useful for routine office fundus examinations of young infants. Satisfactory dilatation is obtained within 30 minutes of the first instillation with a pupil size of six to seven mm.

One of us (D. M. G.) has been working with a large group of patients with retinitis pigmentosa. A high percentage of these people have an additional visual handicap on the basis of complicating posterior subcapsular cataracts. Here, the only therapy short of surgery consists in the employment of short-acting cycloplegics. The sympathomimetic group, neosynephrine and paredrine, and so forth, are too weak to be effective in sunlight, while homatropine and atropine are too long acting.

Cyclopentolate, because of its shorter period of activity, appears to be valuable here in dilating the iris away from the posterior lens opacity. Maintaining the pupil well dilated for six to eight hours as it does, one instillation permits these individuals to get by during the working day—or during the brightest part of the day when the pupil is most exposed to bright sunlight or office illumination which is beyond their control.

Gettes and Leopold,[6] and Ehrlich,[8] studied groups of Negro patients aged nine to 40 years. These investigations found that a one-percent solution of cyclopentolate produced satisfactory cycloplegia in 98-percent of the cases as compared to a 54-percent response using four-percent homatropine in one-percent paredrine solution. The 0.5-percent solution was effective in 66-percent of the patients. The average residual accommodation in these groups was 1.75 diopters following use of one-percent cyclopentolate, whereas, homatropine (two-percent) or homatropine-paredrine combination resulted in 3.50 diopters of residual accommodation.

In the cyclopentolate group spontaneous recovery was complete within 24 hours. The administration of two-percent pilocarpine nitrate at the end of the examinations reduced recovery time to six hours or less. Spontaneous recovery from homatropine cycloplegia occurred within 48 hours (table 3).

Measurements with the Schiøtz tonometer were performed on most subjects, varying in age from four to 93 years, before and after 0.5 and 1.0-percent cyclopentolate administration. These tests indicated no appreciable

TABLE 3

CYCLOPLEGIC EFFECT OF CYCLOGYL: AVERAGE OF RESULTS

(1,035 patients)

Compound	Dosage and Administration (drops)*	Diopters of Residual Accommodation	Time (in minutes)	Spontaneous Recovery (in hr.)	Local or Systemic Toxicity
Cyclogyl 0.5%	2	1.10	60	24†	None
Homatropine 2% or 4%	2	2.00	60	48	None
NEGROES					
Cyclogyl 1.0%	2	1.75	60	24†	None
Homatropine 2.0% or 4% Homatropine in 1% Paredrine	5 2	3.50	60	48	—

* Successive drops at five-minute interva's.
† Recovery time reduced to six hours after one-percent pilocarpine.

differences in intraocular pressure. In two patients, a maximum pressure variation of one plus or one minus scale division of the Schiøtz tonometer was noted by Priestley and Medine.[4] Abraham[7] reported a case in which a slight rise of intraocular pressure was attributed to the mydriasis.

The combined series of 1,035 patients indicated no evidence of local or systemic toxicity or sensitivity due to cyclopentolate. Lebensohn[9] instilled 0.5-percent solution four times daily for three days in a group of patients without any signs of irritation or sensitivity. Within 48 hours after this prolonged treatment, recovery was complete.

The 0.5-percent solution is satisfactory in virtually all cases with the exception of those elderly patients with sclerotic sphincters and in Negroes. In these patients the one-percent solution is the concentration of choice.

DISCUSSION

A review of the American literature on cycloplegic refraction, covering the past quarter century, indicates that a wide variety of dosage schedules and a wide variety of drugs—homatropine (one to five percent) with and without paredrine, benzedrine or cocaine, scopolamine, atropine, methylatropine and dibutoline sulfate,[12-26] have been employed by various authors with an apparently wide range of results insofar as the residual accommodation is concerned (table 4).

The data presented by the various authors would seem to indicate that benzedrine, paredrine, and others adjunct drugs did not add materially to the efficiency of homatropine cycloplegia. The auxillary use of these agents did not shorten the duration of, nor influence the period of accommodative disability following homatropine cycloplegia[16, 17, 25]

Recently, Brickley and Ogle[27] have employed the oculometer as a new medium for the interpretation of residual accommodation. Their study consisted of two parts:

1. The application of this technique to 100 patients utilizing gelatin wafers containing 1/50 gr. of homatropine hydrochloride and 1/50 gr. of cocaine hydrochloride.

2. The application of their results to the figures reported by a group of previous workers who had utilized the blur point technique of estimating residual accommodation. They state in referring to their own group of patients that "according to the accurate data obtained with the oculometer, and under the conditions of this experiment, no residual accommodation remained with the cycloplegia studied."

An attempt was made to account for the

TABLE 4

PUBLISHED RESIDUAL ACCOMMODATIONS IN CYCLOPLEGIC REFRACTION

Author	Agent	Residual Accommodation in Diopters
Prangen[24]	Homatropine & cocaine	1.0
Sudranski[23]	Homatropine & cocaine	1.0
Weinman & Fralick[22]	Homatropine & cocaine	0.9–1.60
Wenaas et al.[17]	1% homatropine	1.66
	2% homatropine	1.34
	5% homatropine	1.58
Moncrieff & Scheribel[16]	2% homatropine	<1.0 in 73% cases
Thorne & Murphey[15]	2% homatropine	0.87
Yasuna[14]	Homatropine & paredrine	1.32
	Homatropine	1.60
Slataper[13]	Homatropine	1.42
Wolf & Hodge[12]	1% homatropine	0.55
Marron[10]	Homatropine & paredrine	1.60
Powell[21]	Homatropine & benzedrine	Not given
Swan[19]	Dibutoline sulfate	Not given*
Gettes[20]	Dibutoline sulfate	1.75–2.25

* Swan states that Dibutoline sulfate is too weak to use as a cycloplegic in children.

disparate results reported by previous groups of workers who had found average residual accommodations ranging from 0.55 to 1.6 diopters with the use of the blur-point method of measurement. The authors analyzed these results in the light of their experiments with the oculometer, and state that, "thus, even by the blur-point technique, under this interpretation, these experiments show that there was no residual accommodation with the cycloplegia used."

It is important to note that, if one is measuring residual accommodation after cycloplegia by the blur-point technique, the dioptric values obtained do not represent residual accommodation, but rather the following three factors:

"1. That the conjugate point to the retina lies 0.5 diopter proximal to infinity, 2. the depth of focus, and 3. that with large test objects such as the printed test card, the sense of blurring is less critical when letters are still recognizable than when they are unrecognizable."

What previous workers have considered residual accommodation which could not be affected by further cycloplegia, is considered to represent depth of focus by these two investigators.

Informal conversations over a period of years with various ophthalmologists indicate that it is a generally accepted practice to employ three days of atropinization prior to refraction of children under the ages of approximately 12 years; whereas, homatropine (one to two percent), with and without paredrine, is employed over that age as an office procedure.

The reasons for employing three days for atropinization are not clear. We have been unable to find the original literature on this subject.

Duke-Elder[25] states that, "Atropine is the strongest cycloplegic known, . . . the action, however, is slow, and it is necessary to prescribe it for two or three days before the examination in order that the paralysis should be complete. In young people where accommodation is powerful it should be given three times a day on three successive days." It is suggested that the amplitude of accommodation should not exceed 1.0 diopter at the time of refraction.

Cowan[29] states that "atropine reaches its maximum as a cycloplegic in about two hours."

Theoretically, the employment of atropine as a cycloplegic has the advantage that an excellent agent is employed at home, prior to refraction, with slight confusion to the

doctor's office routine. The disadvantages in practice are that the cycloplegia is too frequently incomplete because of lack of cooperation on the part of the parent, that there is a long annoying period of accommodative disability, and that the routine is often broken off because of the toxic rashes, flushes, and febrile reactions on the part of the child.

Marron,[15] and Moncrieff and Scheribel,[16] reported a greater residual accommodation after atropine than after homatropine cycloplegia. Since atropine is a more powerful cycloplegic than homatropine, it is difficult to account for their findings. In younger patients, erroneous results may easily be caused by poor technique on the part of the parents administering the drops. This clearly indicates the desirability of a preparation which can be administered entirely in the doctor's office, or in which a final effective instillation can be made upon arrival at the office.

Ideally, the most useful cycloplegic would be one which is wholly controlled by the refractionist. Cyclopentolate would seem to meet that requirement. It can be given in the ophthalmologist's office and the patient be prepared for examination within 30 to 45 minutes; or one drop can be instilled in each eye before leaving for the doctor's office, and a second precautionary drop instilled upon arrival. This method affords a minimum of confusion for the ophthalmologist, a minimum of disturbance and disability for the patient, with resultant excellent working cycloplegia. The period of postrefractive disability can be reduced to a minimum by the use of pilocarpine at the completion of the examination.

Summary

1. The pharmacologic properties of B-dimethylaminoethyl (1-hydroxycyclopentyl) phenyl acetate hydrochloride have been discussed.

2. Clinical evidence supports its use as an efficient cycloplegic and mydriatic because:

a. It produces rapid and extensive mydriatic and cycloplegic effect, even in darkly pigmented irises, with rapid recovery.

b. It is virtually free from undesirable local or systemic effects, such as the rash, flush, and temperature rise frequently induced in young children with atropinization.

c. No evidence of acquired sensitivity has been reported.

d. It does not influence intraocular pressure appreciably.

e. Its administration is under the refractionist's control.

3. A review of the literature indicates that a variety of drugs and dosage routines have been employed as cycloplegics, with a high percentage of success; especially in view of the work of Brickley and Ogle. It would seem advisable to use that method which is the least disturbing to the patient and physician while at the same time affording maximum efficiency.

133 East 58th Street (22).
30 Cooper Square.

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DARK ADAPTATION IN DISORDERS OF THE GENITAL FUNCTION IN WOMEN*

I. Landau, M.D., and Y. M. Bromberg, M.D.
Jerusalem, Israel

Impairment of dark adaptation in menopause, especially at its onset, has been reported by us previously.[1] Variations in dark adaptation have also been noticed in pregnancy, manifested by impairment of the scotopic vision from the fourth to the seventh month, followed by striking improvement in the eighth and ninth months.[2] Impairment of dark adaptation has also been found in men suffering from oligospermia associated with endocrine disorders.[3, 4]

These findings led us to investigate the dark adaptation in various disorders of menstruation due to abnormal ovarian or pituitary function.

Material and Methods

A series of 125 women suffering from various disorders of menstrual function, aged from 15 to 48 years, were examined for dark adaptation. The control series was represented by 80 healthy women with normal menstruation, aged from 20 to 45 years.

The series of 125 patients suffering from various disorders of the menstrual function was made of:

Functional disturbances of menstruation preceding menopause, 45 cases; amenorrhea due to ovarian failure, seven cases; amenorrhea due to pituitary-gonadotropic failure, 34 cases; adiposogenital dystrophy, nine cases; Cushing syndrome, five cases; adrenogenital syndrome, three cases; functional bleeding of adolescence, 12 cases; anterior pituitary hyperhormonotropic syndrome, consisting of functional uterine bleeding, galactorrhea, and thyrotoxicosis,[5] four cases; Chiari-Frommel syndrome (persistent galactorrhea and amenorrhea postpartum), five cases; and one case of precocious puberty.

The group of 34 patients suffering from pituitary amenorrhea included 16 cases in which the gonadotropic failure was accompanied by other pituitary disorders: hyperthyroidism, 10 cases; dwarfism, two cases; panhypopituitarism, two cases and acromegaly, two cases. The remaining 18 patients did not display any other pituitary disorders, and the decreased gonadotropic function was demonstrated by low follicle-stimulating hormone values in the urine.

The various laboratory tests which were performed in order to establish the final diagnosis were: X-ray studies of the skull, electroencephalography, visual-field examinations, basal-metabolic rate, perirenal insufflation, determination of vitamin-A blood level, blood chemistry, 17-ketosteroids, 11-oxycorticoids, and total estrogen titration in the urine. Follicle-stimulating hormone titration in the morning urine was performed in all cases of amenorrhea in order to differentiate the ovarian (high F.S.H. values) from the pituitary (low F.S.H. values) failure. Histologic examinations of uterine mucosa and vaginal smears were performed in the majority of the cases.

Dark-adaptation tests were performed with Koch's adaptometer,[6] which is a modified Hecht's adaptometer. Rod-adaptation tests were obtained after the normal bleaching period of five minutes. After examination of the ocular fundi, refraction, and visual acuity, all cases with pathologic conditions likely to impair the dark adaptation were excluded from the study. The tests were carried out by one and the same examiner and always under identical conditions, and were performed repeatedly on a number of patients. Some patients had vitamin A ad-

From the Ophthalmological and Gynecological Departments of the Rothschild-Hadassah-University Hospital.

* μμL. = millimicron Lambert

TABLE 1

FINAL ROD THRESHOLD IN AMENORRHEA

| Pituitary Amenorrhea | | |

ministered (300,000 units orally daily for three weeks), in order to determine whether vitamin A can influence the dark-adaptation values in such cases.

Results

In the control series of 80 healthy females with normal genital function, aged from 20 to 45 years, the final average rod threshold was log.3μμL.* with a normal range between log.2.5μμL. and 3.6μμL. In patients suffering from amenorrhea the tests for dark adaptation produced the following results (table 1):

a. Thirty-four patients with pituitary amenorrhea displayed an impairment of dark adaptation in all but seven cases, the mean final rod threshold for this group being log.4.21μμL. There was no distinct difference in dark-adaptation values between the group of patients suffering from pituitary amenorrhea without other endocrine disorders and those in whom pituitary gonadotropic failure was associated with other endocrine disorders, such as hypothyroidism or dwarfism. A distinct impairment was found in two cases of amenorrhea associated with acromegaly due to pituitary adenomas (log.7.2μμL. and log.4.4μμL., respectively).

b. Five out of seven patients affected by amenorrhea due to ovarian failure had impaired dark adaptation. The final average of the rod threshold was log.4.27μμL. A marked impairment (log.6μμL.) was found in one patient of this group, 34 years of age, who suffered also from Reynaud's disease.

c. Five patients affected by Cushing's disease of pituitary origin had disturbed dark adaptation, ranging from log.4.1μμL. to log.4.7μμL., while two out of three patients suffering from adrenogenital syndrome showed impaired dark adaptation (log.4.7 and 4.6μμL.).

d. Distinct impairment of dark adaptation was found in all nine patients suffering from adiposogenital dystrophy (the mean final rod threshold was log.5.48μμL., with a range between log.4μμL. to log.7.7μμL.).

e. Five patients complaining of persistent galactorrhea postpartum associated with amenorrhea (Chiari-Frommel syndrome) had normal values of dark adaptation.

The final rod threshold values in patients suffering from functional uterine bleeding were as follows (table 2):

a. All but five out of 45 patients who suffered from excessive uterine bleeding due to an increased estrogen activity preceding the menopause displayed an impairment of dark adaptation, with a mean of log.4.8μμL.

b. Of 12 adolescent patients with func-

TABLE 2

Final rod threshold in functional uterine bleeding

In Adolescence			Preceding Climacteric									Hyperhormonotropic Syndrome			Precocious Puberty		
Case	Age (yr.)	Fin. rod. thresh. (log. μμL.)	Case	Age (yr.)	Fin. rod. thresh. (log. μμL.)	Case	Age (yr.)	Fin. rod. thresh. (log. μμL.)	Case	Age (yr.)	Fin. rod thresh. (log. μμL.)	Case	Age (yr.)	Fin. rod. thresh. (log. μμL.)	Case	Age (yr.)	Fin. rod. thresh. (log. μμL.)
1	15	4.3	1	42	2.7	16	47	4.6	31	42	4.6	1	30	4.7	1	8	2.4
2	15	4.3	2	45	3.9	17	42	4.7	32	48	4.6	2	32	5.0			
3	21	4.3	3	41	4.4	18	40	6.5	33	47	4.7	3	33	4.0			
4	16	4.6	4	46	4.5	19	45	6.7	34	44	4.8	4	32	4.8			
5	20	3.0	5	43	3.6	20	40	4.4	35	41	4.8						
6	16	4.2	6	45	3.6	21	46	3.6	36	45	6.8						
7	17	4.2	7	48	4.5	22	41	6.7	37	48	7.9						
8	20	3.0	8	40	4.7	23	45	4.6	38	42	4.7						
9	13	2.6	9	43	4.7	24	43	4.9	39	45	4.6						
10	13	2.6	10	45	5.4	25	42	2.9	40	43	3.8						
11	17	4.3	11	42	6.7	26	47	4.7	41	42	4.7						
12	15	2.6	12	40	4.9	27	43	5.3	42	46	4.5						
			13	43	4.6	28	41	4.3	43	42	4.3						
			14	42	4.2	29	47	6.6	44	43	4.4						
			15	14	3.7	30	44	4.7	45	46	4.7						

TABLE 3

DARK ADAPTATION IN MENSTRUAL DISORDERS DUE TO ORGANIC BRAIN LESIONS

Case	Age (yr.)	Diagnosis	Clinical manifestations	X-ray of Sella Turcica	Visual fields	Dark Adaptation (log. μμL.)
1	24	Pituitary tumor	Amenorrhea Acromegaly	Markedly enlarged	Bitemporal hemianopsia	7.2
2	47	Pituitary tumor	Amenorrhea Acromegaly	Moderately enlarged	Normal	4.4
3	28	Pituitary tumor	Amenorrhea Galactorrhea	Moderately enlarged	Normal	4.4
4	26	Pituitary tumor	Amenorrhea Galactorrhea	Moderately enlarged	Normal	2.4
5	26	Pituitary tumor	Amenorrhea Dwarfism	Moderately enlarged	Normal	4.3
6	36	Pituitary tumor	Amenorrhea Acromegaly Diabetes	Markedly enlarged	Normal	5.6
7	35	Suprasellar tumor	Uterine bleeding Galactorrhea Thyrotoxicosis	Normal	Bitemporal hemianopsia	5.0
8	19	Suprasellar tumor	Adiposo-genital Dystrophy Diabetes	Normal	Bitemporal hemianopsia	6.4

tional uterine bleeding, seven had slightly impaired dark adaptation, while normal values were found in five. The mean final rod threshold of this group was log.3.66μμL.

c. Four patients affected by functional uterine bleeding, galactorrhea and thyrotoxicosis (anterior pituitary hyperhormonotropic syndrome) displayed distinct impairment of dark adaptation with final rod threshold values of log.4.0μμL., log.4.7μμL., log.4.8μμL., and log.5.0μμL., respectively.

d. The eight-year-old girl with true precocious puberty had normal dark adaptation (log.2.4μμL.).

Seven out of eight patients who suffered from pituitary (six cases) or suprasellar (two cases) tumors had marked impairment of dark adaptation. Dark adaptation was most impaired in three patients who also displayed bitemporal hemianopsia (table 3).

DISCUSSION

The results of this study seem to demonstrate that impairment of the scotopic vision in various endocrine disorders is not due to any of the generally known and accepted factors of impaired dark adaptation.

The conditions associated with impaired dark adaptation are reviewed by Duke-Elder,[7] who divided them into many different categories, according to their etiology. He also stated that there exists a category of cases of impaired scotopic vision, without pathologic changes or nutritional deficiencies and of unknown etiology.

None of the patients examined for dark adaptation in this study presented any known pathologic changes or nutritional deficiencies which could be considered as a cause of impaired dark adaptation, except for their endocrine condition. Clinical examination, normal vitamin-A blood levels, and the fact that huge doses of vitamin A had no effect on the final rod threshold ruled out vitamin-A deficiency as a possible cause of impaired dark adaptation in our patients.

Impairment of dark adaptation occurred also in ovarian and pituitary amenorrhea.

The dark-adaptation values found in ovarian amenorrhea corresponded to those obtained in menopause, a condition also due to ovarian failure.

Since impaired dark adaptation occurs in conditions due to failure of estrogen production (ovarian amenorrhea and climacteric), it could be assumed that estrogens may play a role in the regulation of scotopic vision. However, this could not be proved by our observations, since treatment with estrogenic substances did not improve the dark adaptation in these conditions, even if doses sufficient to alleviate vasomotor symptoms of the climacteric were administered.

The question may arise as to whether the impaired dark adaptation in both ovarian and pituitary amenorrhea is due to a common cause. This seems probable since the ovarian-pituitary relationship is well established and consists of the ovarian response to the pituitary gonadotropic hormones and the regulating action of ovarian hormones upon pituitary gonadotropic activity.[8]

It has also been demonstrated in animals that the pituitary-ovarian relationship is activated by centers situated in the hypothalamus.[9, 10] In humans, tumors or infections of the hypothalamus may affect the function of the gonads and the fat metabolism, causing the syndrome of adiposogenital dystrophy.[11] All nine patients suffering from adiposogenital dystrophy (table 1) displayed impaired dark adaptation. On the other hand, in seven out of eight patients affected by tumors, pituitary or hypothalamic, the dark adaptation was distinctly impaired. These findings may support the assumption that the hypothalamus which contains centers regulating various metabolic and gonadotropic functions may also play an important role in the mechanism of the scotopic vision.

Impairment of dark adaptation was also found in functional uterine bleeding in adolescents (seven out of 12 cases), and in menstrual disorders preceding the menopause (42 out of 45 cases). The functional uterine bleeding in both these conditions is mostly due to increased estrogenic activity.

The hyperproduction of estrogens in adolescents is due to excessive secretion of pituitary-gonadotropic hormones which regulate the amount of estrogens produced in the ovarian follicles.[12] The uterine bleeding preceding climacterium is most frequently caused by persistence of ovarian follicles producing estrogens due to local changes in the ovaries.[13]

A very marked interference with scotopic vision was observed in all four patients with anterior pituitary hypohormonotropic syndrome, suffering from functional bleeding induced by excessive estrogenic activity.

The question may arise as to why impaired dark adaptation occurs in hormonal dysfunctions so different from one another as failure and excessive production of estrogens, as well as in hypogonadotropic and hypergonadotropic conditions. This question cannot be answered on the basis of our present knowledge.

It seems that the hypophysis cannot be considered as a primary site in regulation of the scotopic vision in these conditions. It has been demonstrated by many workers in the field that the hormonal activity of the pituitary devolves from higher centers in the hypothalamic region.

As impaired dark adaptation was found to occur in conditions related to functional and organic disturbances of the hypothalamus, it may be suggested as a hypothesis that impairment of scotopic vision in various endocrine conditions is due to a disorder in the hypothalamic region.

Summary

A series of 125 women suffering from various endocrine disorders of menstrual function and 80 healthy women with normal menstruation were examined for dark adaptation.

Impairment of dark adaptation was found in 27 out of 34 cases of pituitary amenorrhea and in five out of seven cases of ovarian amenorrhea.

In functional uterine bleeding, dark adaptation was slightly impaired in five out of 12 adolescents, and more distinctly in 42 out of 45 patients suffering from uterine bleeding preceding menopause.

The more markedly disturbed scotopic vision was found in patients with adiposogenital dystrophy and with tumors in the pituitary hypothalamic region. The relationship between the mechanism of the scotopic vision and the hormonal disorders of the genital function is discussed.

The results of this study may support the assumption that the hypothalamus, which regulates various metabolic and gonadotropic functions, possibly also plays a role in the mechanism of the scotopic vision.

Rothschild-Hadassah University Hospital.

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THE PHYSIOLOGIC CONSTRICTIONS IN THE OCULAR VEINS*

H. G. Swann, Ph.D.
Galveston, Texas

The hydrostatic pressure in the veins of the uvea is about 22 mm. Hg; in the intrascleral veins it is about 21.5 mm., but in the episcleral vortex veins, only a millimeter or two distally, it is only 13 mm. Hg,[1] or perhaps even less.[2] Because of this abrupt drop in pressure, Duke-Elder[3] reasons that the "veins of the eye are physiologically constricted at their exits."

Before the discovery of these pressure relationships, several authors postulated the existence of such a constriction on other grounds. Holz,[4] while considering pressure pulses in the eye, hinted at its existence, and Heerfordt,[5] discussing the etiology of glaucoma, postulated that the walls of the vein sinus might be so pressed against each other or so folded, primarily by a high intraocular pressure, as to cause venous stasis and thus the high intraocular pressure of glaucoma.

Heerfordt also reasoned that a high intraocular pressure must exert itself on the entire vascular bed of the eye, but that its primary action would be to narrow the veins just as they leave the boundary of the region subjected to the high intraocular pressure. This point, he suggested, lies at the entrance to the vortex veins. Examination of the eyes of glaucomatous individuals revealed, in Heerfordt's opinion, constrictions in this region.

Present study

In spite of these hints about the nature of the constriction, it still remains mysterious. It is the purpose of this paper to describe what happens, in the hydraulic sense, when fluid flows through a collapsible tube which is subjected to external pressure. It is this situation which pertains in the eye, because its vascular system is subjected to the intraocular pressure of about 20 mm. Hg.

The hydrodynamics of such a system were studied in a simple model. Because certain morphologic structures in the vortex veins of the eye resemble closely those of the model, it is postulated that the vortex veins behave in the same way as does the model, and a hypothesis is presented to describe the dynamic morphology of the physiologic constrictions deduced by Heerfordt and Duke-Elder.

The finer structure of the vortex veins was first described by Fuchs.[6] Their walls are ribbon-thin (five micra) until just at their point of exit from the eyeball. Here the walls abruptly thicken to 20 to 60 micra. A lymph channel surrounds most of the perimeter of the vein and accompanies it along its oblique path through the rigid sclera.

The veins are anchored in the scleral canal by delicate diagonal webbing which runs from the canal walls into the adventitia. They are also anchored to the meridional scleral fibers by coarse membranes, usually two in number, fastened to the adventitia and placed on opposite sides of the veins.

Model used

The model resembling these veins was originally made to study fluid flows through a collapsible tube surrounded by a high "tissue" pressure.[7] It is diagrammed in Figure 1; in its functional aspects it is the same as that constructed to study tissue pressures in the kidney, these being probably about 25 mm. Hg.[8]

The reservoir H, as drawn in Figure 1, delivers water into the collapsible tube V (surgical drainage tubing, O.D., 13 mm., shown with wavy lines) and thence to the outlet. The collapsible tube is surrounded by the rigid, water-filled sphere S, the pressure of which is controlled by reservoir I.

* From the Department of Physiology, University of Texas Medical School.

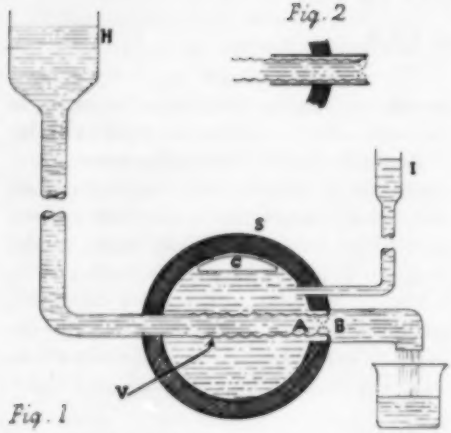

Fig. 1

Fig. 2

Figs. 1 and 2 (Swann). Model used for studying functional venous constrictions. See text for explanation.

When set into operation, with pressure H greater than pressure I, the walls of the collapsible tube, at its most distal point, fold in, thus making the constriction illustrated in Figure 1 by the dotted lines between A and B. Point A is subjected to pressure I, point B is not; and the constriction forms between them, just at the boundary of the region of high external pressure. The lateral pressure at A is just greater than pressure I, whereas that at B, only a few millimeters downstream, drops almost to zero. And the greater the ratio of pressure I to pressure H, the stronger is the constriction.

An even more graphic way of illustrating the formation of the constriction at the boundary of the region of high external pressure is to run the collapsible tube through a long glass tube and then to evert it over the end of the glass tube. This is illustrated in Figure 2. The constriction still forms at the distal end, for pressure I is carried down the narrow channel between the collapsible tube and the glass tube.*

Dynamics of constriction

The dynamics of formation of this constriction are as follows:

As water flows through tube V, its static head decreases due to the frictional resistance to flow. Now if pressure I is imposed, and if it exceeds any of the infinite number of static pressure heads along tube V, it will tend to collapse the tube at all of these points.

The most distal point will be collapsed to the greatest extent, since the effective collapsing pressure (that is, the difference between pressure I and the static head) is greatest at this point. Because of the stronger constriction, the velocity of flow at the distal point will be greatest and, by the Bernoulli principle, the lateral pressure (or static head) least. This then will make the effective collapsing pressure even greater at the distal point and strengthen the constriction still more.

Since, because of the constriction, flow rates through the whole collapsible tube are lessened, lateral pressures proximal to the distal constriction increase and expand the tube at all points except the distal one.

At the most proximal point, originally only slightly collapsed, the velocity decreases after the expansion, and therefore the lateral pressure increases enough so that now it definitely exceeds pressure I. In turn at the next proximal point the process repeats itself, and so on all the way down to the original distal constriction. Hence, all of the effects of pressure I are exerted at a single point in the collapsible tube: the extreme distal end. It is exactly this conclusion that Heerfordt deduced in 1911.[5]

Localization of constriction

The genesis and localization of the constriction is best visualized in the following experiment:

* The system has a strong tendency to "flutter," that is, to vibrate very rapidly as the functional constriction opens and closes. The dynamics of this flutter have recently been discussed by Rodbard.[6] Fluttering can be prevented by several measures: (1) keeping the tube V loose, that is, not pulling it taut; (2) putting in a large air bubble at C; (3) placing a resistance between reservoir H and tube V; or (4) making the system drain into the open air, as illustrated in Figure 2.

Pressure I is first set equal to pressure H. Flow, of course, is now minimal because the entire collapsible tube is constricted. Then if pressure I is lowered slightly and flow begins, the constriction starts to appear. But it is a very long one—it occupies, perhaps, the distal three fourths of the collapsible tube.

Now if pressure I is again lowered slightly, the constriction "descends"; it now occupies the distal half of the tube. And so on with each successive decrease in pressure I; finally the constriction descends until it occupies only the extreme distal segment.

The cause for this behavior lies within the Bernoulli principle: with the establishment of greater velocities, as pressure I is being progressively decreased, the most distal segment, being the most constricted, has less lateral pressure and hence is subjected to the greatest effective collapsing pressure. Usually, of course, the distal constriction is set up immediately; equilibrium is established at once without going through the sequential steps described above.

Rates of fluid flow

Rates of fluid flow through the model have been ascertained while varying pressures in reservoir H and in "tissue" pressure I. They are found to vary thus, as a first approximation:

The flow rate is directly proportional to the difference between the reservoir pressure and the tissue pressure. It is apparent that the pressure imposed on the collapsible tube acts like a counter-pressure; its action can be duplicated by raising the level of the effluent to the same level as pressure I. But, as described above, pressure I actually opposes flow by imposing a distal constriction in the system, and this constriction is a variable and functional constriction. As already mentioned, it gets stronger or weaker depending directly on the ratio between pressure I and pressure H.

This system, in which a resistance acts as, and may be phrased in terms of, a counter-pressure is an unusual one in hydraulics. Usually the parameters of flow, pressure and resistance are kept sharply separated; resistance, of course, is defined as the ratio between pressure and flow. But in this system, the constriction may be described in terms of counter-pressures only, even though it acts as resistance.

Vortex veins of eye

Precisely the same hydraulic factors are postulated to be at work in the vortex veins of the eye.* Structurally they resemble the model closely; the walls of rigid chamber S represent the sclera; the tube V runs through these walls surrounded by a small channel of fluid held at pressure I, this being the same as the lymph channel surrounding the vortex veins as they course through the scleral canal. Pressure I is intraocular pressure.

In the model, the constriction naturally forms at the distal end of the collapsible tube, that is, at the boundary where it leaves the influence of pressure I. So in the eye, a constriction would naturally form at the point of exit of the veins from the sclera where, presumably, the pressure of the surrounding lymph channel is no longer imposed (figure 2 illustrates this well). It will be recalled that the vein walls abruptly thicken at this point: probably the constriction forms just proximal to the thickening by a folding in of the vein walls.

This then is postulated to be the "physiologic constriction" in the ocular veins, for it is exactly at this point that the venous pressure suddenly falls. The vein walls' thickening, it may further be supposed, is a morphologic adaptation to the fact that at this point the intraocular pressure is no longer effective in helping to contain the lateral pressure within the veins.

Heerfordt,[8] as previously discussed, placed the constriction in the proximal end of the

* And, as well, other organs of the body which have a relatively restricted volume, for example, the brain or kidney.

scleral canal. Because, however, we now know that the pressure drop occurs at the exit of the vein,[1] it is apparent that his localization of the constriction was in error. But he was entirely right in his postulates concerning the factors which create its constriction.*

It is to be noted that the constriction observed in the model is a functional constriction, established by the hydraulic characteristics of the system. When no water flows through it, the constriction disappears. So also in the eye, the postulated constricting mechanism in the vortex veins would be present only when the eye is being normally perfused with blood. It is a passive and functional constriction only, set up by the dynamics of blood flow through the system, and it would disappear when blood flow stopped, as, for example, at death. The constriction would therefore not be apparent at autopsy.

We suspect that one very important action of this venous throttling device is its effect on capillary pressures. The constriction in the venous effluents would act like a dam; it would back up pressure into the intraocular capillaries so that their pressure would be relatively uniform. They would not have a net drop of 16 to 20 mm. Hg along their course, as is true of the nail-bed capillaries and mesenteric capillaries.[11]

Rather, the intraocular capillaries, these being exceptionally large and dilated anyway,[1] would have a net drop in pressure along their course of only a few millimeters. In terms of the Starling hypothesis of circulation between capillary and tissue, this, coupled with the high tissue pressure, would have one unfavorable consequence: it would tend to reduce the filtration and resorption rates at the proximal and distal ends, respectively, of the capillary.

On the other hand, it would favor constancy of filtration and resorption, thus freeing circulation across the dilated capillary walls from the vagaries of the shifting and irregular capillary pressures that are apparently so prevalent in skin capillaries.

This assumes that ultrafiltration and resorption are at work in the eye, processes governed, according to the Starling theory, by hydrostatic and oncotic pressures. But this is by no means proven: if secretion and diffusion are instead primarily involved, as is perhaps the case with formation of aqueous humor,[12] pressure relations different from these in the "Starling capillary" could be anticipated.

In a secretion-diffusion system, hydrostatic pressures and pressure gradients would best be minimal, because if they were strong, they would tend to disrupt, or even override, the secretion and diffusion processes that are taking place.

Hence in the eye, it is suggested, effective filtration and resorption pressures and also hydrostatic gradients are small; they do not, therefore, tyrannize capillary exchange —they do not encroach upon the secretion-diffusion exchange that is primarily operative.

It is perhaps fundamentally for this reason, to speak teleologically, that the eye's vein constrictors are present.

Drainage of Schlemm's canal

The drainage action of Schlemm's canal can also readily be illustrated with the model. Flow is first established with pressure H at a medium level and pressure I, of course, below it. Now when pressure H is raised, some fluid is pushed out of chamber S and up into tube I, the cause being the increased expansion of tube V, produced by the higher pressure head. But if one prevents this expulsion of fluid by clamping off the tube leading to reservoir I, the pressure in chamber S (measured isometrically) rises greatly.

* The flow dynamics in the other ocular veins, including the aqueous, are probably similar to those of the vortex veins, with constrictions somewhere in their exits. In the case of the central retinal vein, it too is surrounded by loose connective tissue which is split up into longitudinal perivascular spaces.[10]

If bubble C is not present, in fact, the pressure in this chamber rises almost as much as pressure H rises.

This demonstrates how, with blockage of the aqueous drainage, any increase in blood pressure induces violent changes in intraocular pressure. If fluid cannot drain out of the eye by routes other than the venous drainage, the situation is potentially very dangerous, because the functional venous constrictions, governed in part by the blood pressure as they are, lie within a chamber with rigid unyielding walls.

Relation to etiology of glaucoma

With respect to the etiology of glaucoma, recent attention has been especially focussed upon formation and drainage of aqueous humor, somewhat to the neglect of other possibilities.[13] That drainage of venous blood may also be involved has of course long been recognized (Roser[14] in 1859; Duke-Elder[3]; Becker and Post[15]).

A noticeable contribution to this concept is that of Heerfordt,[5] who postulated, as previously discussed, that venous blockage occurs in glaucoma just at the point where the vortex veins enter the sclera. The matter deserves re-examination:

Blockage may occur at Heerfordt's point, but other points along this peculiar vascular channel, with its functional constriction, may be involved as well. Specifically the course of the veins through the sclera, their associated structures, and the point of exit of the veins from the sclera appear to be the points to examine. Technically the matter may turn out to be a considerable challenge, because if the venous constrictions are functional only, post-mortem examination may give no clue to the nature of the trouble.

Summary

Because the venous pressure in the veins of the eye suddenly drops as the veins emerge from the eyeball, a physiologic constriction at the exit point has been postulated. A model to mimic this peculiar type of venous constriction is described, and some of the hydraulic factors governing the creation and behavior of such constrictions are formulated. It is postulated that the same factors create and govern "functional" constrictions in the eye veins. In the vortex veins, morphologic as well as physiologic considerations fix the location of these constrictions just at the episcleral exit.

Department of Physiology,
University of Texas
Medical School.

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CORRELATION BETWEEN BIRTH WEIGHT AND VISUAL ACUITY*

From the age of five through twelve years

Thomas H. Eames, M.D.
Boston, Massachusetts

Until recently it was generally believed that the ill effects of premature birth were confined to early childhood and that the maturation process caught up with normal expectations before the age of school entrance.

I have been studying the effect of premature birth on school children and have been able to show in previous studies that, among 155 premature and 439 full-term cases, the frequency of low vision (20/30 or poorer) is higher through the age of 17 years among the prematurely born and that the same group presents a lower median visual acuity through the ninth year.[1]

I have also reported a study of a random sampling of 100 cases of reading failure in which 15 percent were found to have been prematurely born.[2] This is considerably higher than the frequency among the general population.

The criteria of prematurity used in the previous studies was a birth weight of 5.5 lb. or less or birth before completion of the normal term of pregnancy. It has been noted, however, that the tendencies diminish at the upper limit of the birth-weight criterion (5.5 lb.) and that, when cases are classified according to length of term, the tendencies blur out.

The present study concerns itself with the correspondence between birth weight and visual acuity. Here a child is considered premature only when his birth weight is *less than five pounds*. The time of term is not considered reliable enough to be used as a criterion in this and future studies.

Eighty pupils from grades I through VI were studied. Their age range was from five through 12 years and their median age was eight years, eight months. First a group of 20 nonfailing pupils having a history of birth weight of five pounds or over was compared with an equal number of children whose birth weight was less than five pounds. Birth weight was correlated with visual acuity in each group by the Spearman rank-difference-squared method.

A negative correlation coefficient of 0.10 was found among the pupils weighing over five pounds at birth, while a positive coefficient of 0.26 occurred among those weighing under five pounds (the premature group). Neither correlation is very great but the tendency for the premature group to present the higher correlation is worth noting.

The second part of the study was a comparison of the correlations for two groups of reading failures. These pupils were sufficiently retarded in reading to have been the object of remedial reading instruction. The groups were of the same size as the others.

The reading failures presenting a history of birth weight of over five pounds exhibited a coefficient of correlation of plus 0.12, while those with birth weights below five pounds had a coefficient of plus 0.56. Again, the premature group presented a higher correspondence between birth weight and visual acuity. Possibly the fact that the coefficient

* From the School of Education, Boston University.

TABLE 1

CORRELATION BETWEEN BIRTH WEIGHT AND VISUAL ACUITY

	Nonfailing Pupils		Reading Failures	
	No. cases	Coefficient of Correlation	No. cases	Coefficient of Correlation
Birth weight over 5 lb.	20	−0.10	20	0.12
Birth weight under 5 lb.	20	0.26	20	0.56

for the premature group of reading failures was about twice that for the premature group of nonfailing pupils may have some significance.

It is important to remember that all of these coefficients are low. The minus 0.10 and the plus 0.12 coefficients mean that there was practically no correspondence between birth weight and visual acuity in the two groups where these figures were obtained. The plus 0.26 coefficient is a little stronger in its indication of a relationship but it would be open to some statistical doubt. The plus 0.56 however, though not a high coefficient, is great enough to indicate some definite correspondence or coexistence. It must also be stated that the small number of cases is a limitation, emerging from the slow rate of accumulation of pupils presenting a history of premature birth.

I regard the tendencies rather than the actual correlative values to be of greater significance here. These tendencies appear to support earlier findings and to strengthen the case for giving attention to prematurity of birth as a possible factor in both poor vision and poor reading, at least in certain cases.

SUMMARY

A group of 80 children from the first six school grades, with a median age of eight years, eight months, were studied as to a possible correspondence between birth weight and visual acuity. A nonfailing group of children whose birth weights were over five pounds were compared with another nonfailing group whose birth weights were under five pounds. A group of reading failures with birth weights over five pounds were compared with another group of reading failures whose birth weights were under five pounds. The results were:

1. A tendency appeared for those with birth weights over five pounds to show little relationship between birth weight and visual acuity.

2. A stronger, but not marked, relationship was indicated between these factors in both of the groups whose birth weights were less than five pounds. The coefficient of correlation among the reading failures was a little more than twice as great as that of the nonfailures.

3. The coefficient of correlation for the factors studied was nearly five times as great among the reading failures with birth weights less than five pounds as among the reading failures with birth weights over five pounds.

4. The tendencies shown are regarded as of more importance than the actual numerical values.

332 Bay State Road.

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NOTES, CASES, INSTRUMENTS

COATS' DISEASE

(RETINITIS EXUDATIVA)

A CLINICOPATHOLOGIC STUDY

ISADORE GIVNER, M.D.
New York

In 1908 Coats described cases of "retinal disease with massive exudations." He believed the original change to be hemorrhages in the deeper layers of the retina. He divided the cases into two groups:

1. Those in which there was no vascular disease.
2. Those in which marked vascular changes were present.

The disease occurs mostly in young persons and affects only one eye. In a few cases bilateral involvement has occurred. The disease progresses slowly and may be called to attention in children by the development of a strabismus. The cornea, anterior chamber, iris, and lens are normal early in the disease. The vitreous usually does not, but may, show opacities.

Characteristically an exudate in the retina is found, usually in the posterior portion of the fundus, near the disc and macula. The exudate is white or yellowish white and is situated deep to the retinal vessels. Hemorrhage may occur near the veins or on the top of the exudates. Cholesterol may be present. In a large percentage of cases, fusiform and spheric aneurysmal dilations occur on the veins or the arteries in the smaller branches.

The course is usually progressive. Hemorrhage into the vitreous may precede a retinitis proliferans. Later, the retina detaches and resembles a pseudoglioma. Cataract formation, iritis, and occasional changes in the tension may ensue.

Pathologically, connective tissue between the choroid and retina occurs. In this connective tissue may be found broken-down red cells, cholesterol, and pigment. In the retina the thickening occurs with a serous fibrinous exudate. The outer nuclear layer and the layer of rods and cones are first involved.

The exudate is invaded by phagocytes, the so-called "ghost cells" or bladder cells which Leber believed to be derived from the pigment epithelium. Elwyn believes some are probably histiocytes from the adventitia of the blood vessels. The lamina vitrea is usually intact.

The vessels show marked dilation and congestion, occasional thrombi, and hyaline degeneration of the vessel walls. Coats believed the primary change in the small vessels is the cause of the hemorrhages that initiate the pathologic process. Elwyn reasons that, with the dilated vessels, a slowing of the blood stream occurs that allows for transudation of plasma and blood. Heath classifies this disease as a vascular retinopathy, which coincides with the above interpretation.

As regards etiology, Duke-Elder, in addition to the above interpretation, mentions some cases of an inflammatory nature as due to syphilis, tuberculosis, and other infections.

It would seem to me that when vascular anomalies occur without evidence of inflammation, Coats' disease should be considered. However, when exudates occur with no vascular anomalies, and a specific cause for the inflammation can be found, the condition should not be classified as Coats' disease but should be described by its etiologic cause as luetic retinitis exudative.

CASE REPORT:

R. T., a women, age 22 years, was first seen November 10, 1942. For the past seven months vision of the left eye had become very poor. The tension was normal. A mass was seen behind the pupil (detached retina). The globe did not transilluminate. She had been advised to have an enucleation by

Fig. 1 (Givner). Complete detachment of the retina.

another ophthalmologist who suspected sarcoma. The case was seen with Dr. Bernard Samuels in consultation. He felt the findings suggested Coats' disease, but considered enucleation the safest method of handling this case. No calcium deposits were visible on X-ray examination of the left eye.

The histopathology of the left eye, as reported by Dr. Samuels after enucleation, disclosed the following:

The anterior chamber angle was occluded by anterior synechia on one side. Albuminous fluid was in the anterior chamber.

The iris was edematous and infiltrated with lymphocytes and plasma cells. On the anterior surface of the iris one could see a newly formed cellular membrane. An adhesion between the ciliary processes and the root of the iris was present.

In the region of the ciliary body a detached retina overlay the ciliary epithelium.

In the choroid some lymphocytes were found in the vascular layer. The blood vessels were congested.

The entire retina was detached (fig. 1). In the folds of the retina were hyalinized masses, blood pigment (fig. 2-b), and cholesterin spaces (fig. 2-a) surrounded by

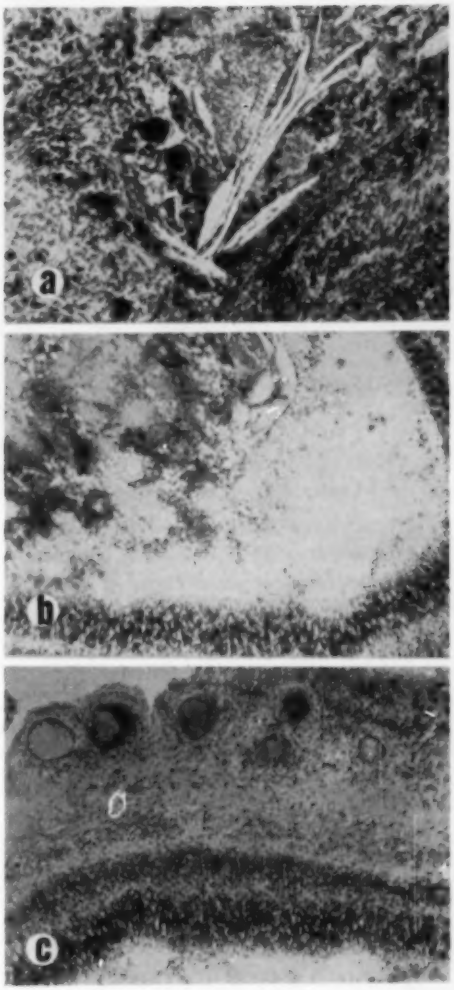

Fig. 2 (Givner). (a) Cholesterin spaces in the folds of the retina. (b) Blood and blood pigment in the folds of the retina. (c) Thin-walled blood vessels in the retina.

foreign-body giant cells. These masses arose from the external layers of the retina. Adjoining this area were many thin-walled blood vessels (fig. 2-c); some were damaged and dilated and others lacked a vessel wall. The subretinal fluid was albuminous and contained many "ghost cells" (fig. 3-a and b).

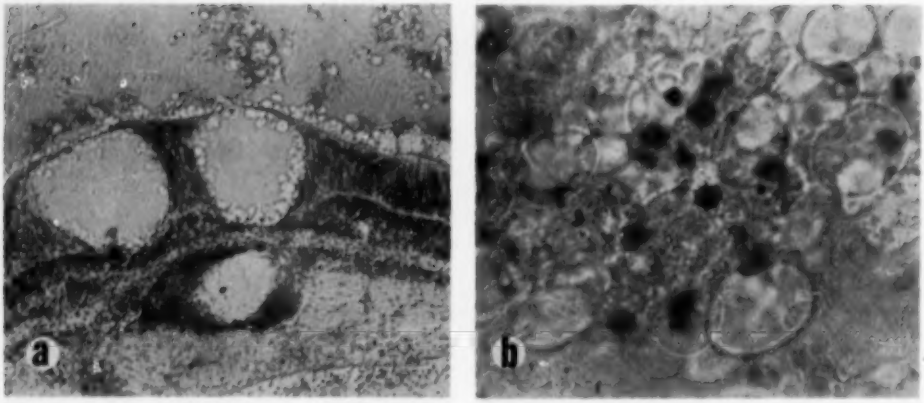

Fig. 3 (Givner). (a) Ghost cells in the subretinal fluid (low power). (b) Ghost cells in the subretinal fluid (high power).

Conclusion

In considering a differential diagnosis in a young patient with a unilateral completely detached retina, one should bear in mind the possibility of the condition being Coats' disease.

108 East 66th Street (21).

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SITUS INVERSUS OF THE OPTIC DISC

With inferior conus and variable myopia: A case report

William Charles Caccamise, M.D.
Rochester, New York

Situs inversus of the optic disc is that condition in which the disc appears to be inverted. The vessels arising from the disc come from the temporal side and pass nasally. The temporal half of the disc is full; it does not demonstrate the usual physiologic cup. After the vessels have left the disc, their distribution is normal. It has been theorized that this anomalous vascular pattern is due to a tilt of the disc which incorrectly determines the order of the vessels.[1]

Limited reference to situs inversus has been made in the American literature. The fundus drawing that has probably been referred to more than any other is that by Hamblin.[2, 3] The legend identifies it as situs inversus of the left eye. It should be pointed out, however, that this can be correct only if the view is considered to be that obtained by indirect ophthalmoscopy. Photographs of the fundi in typical situs inversus are to be found in articles by Rucker.[4, 5]

In contrast to the American literature the German literature furnishes a detailed discussion of situs inversus.

In 1882, in a classic paper concerning congenital anomalies of the optic nerve, E. Fuchs described for the first time the frequent association of situs inversus with conus inferior.[6]

In 1883, A. von Szily, Sr., brought attention to two phenomena that frequently are found with conus inferior: (1) The lower half of the fundus has less pigmentation than that of the upper half and (2) the error of refraction of the lower half of the fundus is frequently greater than that of the macular region or temporal fundus.[7]

Myopia has been found in a majority of the cases. Conus inferior has also been referred to as Conus nach unten[7, 8] and Fuchs Coloboma.[9] It is located below and may extend either to the temporal or nasal side of the disc.

Conus is believed to represent a congenital anomaly and is not progressive. It should not be confused with the more common myopic crescent, which is not congenital and usually is at least somewhat progressive. In addition, the myopic crescent is most frequently located on the temporal side of the disc and in such cases there is no increased incidence of situs inversus. In so-called myopia inversa,[9] however, a myopic crescent does occur on the nasal side of the disc and in such cases there is a frequent occurrence of situs inversus.

Rucker[4, 5] has demonstrated the occurrence of temporal field defects for small targets on the tangent screen in both situs inversus alone and inferior conus alone. These defects have been attributed to distortion of the optic disc and possibly also defective choroid nasal to the disc.

Case report

The following case is submitted as a typical example of this definite complex—situs inversus of the optic disc, inferior conus, decreased pigmentation inferior to the disc, different degrees of refraction in various portions of the fundus, and tangent screen defects. No mention of this syndrome was found in a review of the standard ophthalmic texts used by American ophthalmologists.

Mrs. C. A., a 37-year-old white woman, was first seen in the office on November 28, 1953, with a presenting complaint of a tired feeling in her eyes on watching television. She had worn a correction for myopia for several years. Otherwise the ocular and systemic histories were noncontributory.

The uncorrected visual acuity was 18/200, O.D., and 19/200, O.S. With her glasses which had been prescribed two years previously (−1.75D. sph., O.D.; −1.5D. sph., O.S.) the visual acuity was 20/40, O.D.; 20/30, O.S. With the addition of the multiple pinhole disc the visual acuity was 20/30, O.U. The near-point of accommodation was a normal 170 mm., O.U.

External examination, including biomicroscopy, was normal.

Cycloplegia was obtained by use of homatropine (five percent) and paredrine (one percent).

Ophthalmoscopic findings, O.D., normal orange-red reflex. Media clear. Disc of normal color; no elevation; edges distinct. There was a well-defined inferior conus which was approximately one-third prism diopters in width and extended along the disc inferiorly from the 4- to 8-o'clock position. The boundary between the conus and disc formed a horizontal line.

The vessels arising from the disc came from the temporal side and passed nasally —the typical pattern of situs inversus. After leaving the disc, the vessels demonstrated a normal pattern.

The macula was normal in appearance and showed a normal foveolar reflex. The superior portion of the fundus was homogeneously tessellated. However, that portion of the fundus immediately inferior and nasal to the disc and extending for a distance of approximately three to four prism diopters from the disc showed a definite thinning of pigmentation.

O.S., similar to O.D.—that is, situs inversus, inferior conus, decreased pigmentation inferior and nasal to the disc. However, the boundary between the inferior conus and the disc was the normally curved inferior border of the disc.

The corrected retinoscopic findings were:

	At Macula	*At Disc*	*In Area Decreased Pigmentation*
O.D.,	−2.25D.	−4.50D.	− 8.25D.
O.S.,	−1.00D.	−4.50D.	−10.00D.

Subjectively the patient accepted −2.5D. sph. for the right eye and −1.5D. sph. for the left eye with a resultant corrected visual acuity of 20/30, O.U.

Field studies revealed:

With the one-meter tangent screen and two-mm. and three-mm. white test objects there was a definite bitemporal field defect similar to that found by Rucker[4, 5] in his cases. The isopters passed over the midline without alteration of their course. The outline of the tangent screen defect rather closely resembled the pattern of the less pigmented area of each eye.

76 South Fitzhugh Street.

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OCULAR FINDINGS IN HYPERCALCEMIA*

A CLINICAL AND HISTOLOGIC STUDY

VICTOR GOODSIDE, M.D.
Bronx, New York

That ocular lesions exist in conditions associated with hypercalcemia has been adequately recorded by many authors including Cogan, Albright, and Barter,[1] Walsh and Howard,[2] and Walsh and Murray.[3] The mechanisms by which hypercalcemia is produced in hyperparathyroidism, Boeck's sarcoidosis, vitamin-D poisoning, chronic nephritis, and excessive calcium and alkali intake, are described at length in the monumental work of Albright and Reifenstein.[4] It would not seem worthwhile at this time to discuss them except to say that the ocular findings when noted in these conditions are a result of the hypercalcemia.

Justification for making the present report rests on the fact that (1) the globe was obtained for histologic study and (2) the interesting funduscopic picture was perhaps related to the other ocular conditions noted.

The ocular findings repeatedly observed by many writers consist of conjunctival and corneal lesions—the former being minute glasslike nodules containing whitish flecks thought to be calcium phosphate; the latter taking the form of a band-shaped keratitis with the heaviest opacity at the limbus and shading off axialward. Howard and Meyer[5] noted in a number of cases that the conjuctival lesions receded with improvement but that the keratopathy did not. Fleischner and Shalek[6] were able to demonstrate calcific deposition on X-ray examination of the orbit in areas consistent with the clinical findings.

Histologic studies described in the literature are meager and are confined to two biopsies of the nodular conjunctival lesions, and histologic examination of one globe from an individual who had taken milk and alkali in excess for many years for duodenal ucler. The globe had been removed because of an entirely incidental painful glaucoma.

* From the Ophthalmologic Service of the Lebanon Hospital.

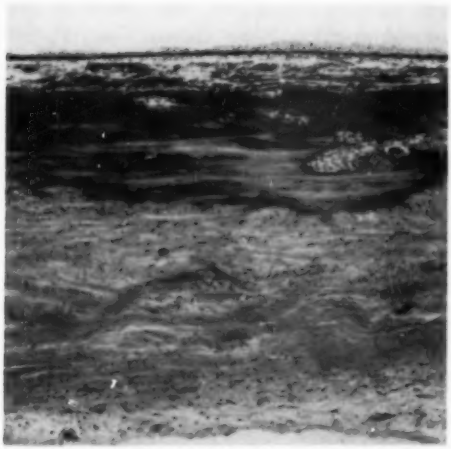

Fig. 1 (Goodside). Calcareous plaque in the sclera.

Fig. 2 (Goodside). Section at the limbus, showing calcific deposition in the subconjunctiva in a straight line continuous with the calcified Bowman's membrane.

Walsh[2] in his examination of the nodular conjunctival lesions noted the presence of amorphous purple-staining material in the superficial connective tissue which he took to be calcium phosphate. Cogan's findings, although the eye he examined histologically was the site of an old penetrating injury and had come to enucleation as the result of painful glaucoma having nothing to do with systemic hypercalcemia, are very much like those of the case to be presented except as to the extent of calcific deposition in the sclera.

Case report

A young white woman, aged 25 years, was hospitalized from February 24, 1947, until March 19, 1947, with symptoms of weight loss, nervousness, and tachycardia. A note was made at that time of complaint of ocular pain and redness but no ocular consultation was obtained. The diagnoses of hypertensive disease or of possible thyroid toxicosis were considered. A small mass in the right side of the neck suggested the diagnosis of thyroid adenoma. The patient was discharged somewhat improved.

The second and final admission to the hospital was on November 16, 1952, at which time the history was that there had been no complaints until three months before admission when the patient became weak and tired. Elevated blood pressure was noted and she complained of pain in both eyes and photophobia. A small nodule thought to be in the thyroid gland was again noted.

A review of the skull film taken in 1947 suggested the possibility of hyperparathyroid disease, and this was borne out by blood calcium and phosphorus studies and by further X-ray studies of the skull and long bones. Blood calcium ranged between 16 and 17.7 mg. per 100 cc.; blood phosphorus about 2.9 mg. per 100 cc.; and alkaline phosphatase at 24.1 to 25.7 Bodansky units.

Ocular examination was made under some difficulty because of the considerable photophobia. Slitlamp examination was not performed since the patient was confined to bed and, perhaps for this reason, the frequently described conjunctival nodules were not noted at this time.

There was chemosis and injection of the bulbar conjunctiva of both eyes, the involvement being most marked in the interpalpebral fissure. Here the injection extended to the limbus and was continuous with a chalk-white line extending for four mm. along the limbus.

Central from this chalk-white line and also in the interpalpebral fissure was a fainter superficial corneal opacity likewise vertically oriented and separated from the calcium line by what seemed to be a clear interval. The calcium line and the fainter opacity were noted both at the nasal and temporal limbus in each eye.

The fundi were somewhat distorted as a result of a high degree of astigmatism. Discs were pale and vertically oval. The retinal vessels were rather attenuated. Scattered throughout the central areas were very numerous pale-pink, poorly defined lesions of many shapes lying underneath the retinal vessels. In many areas they were coalescent and in the macula they became larger, reaching the size of 0.25 disc diameters. Between these patches there appeared an increase in retinal pigmentation in many areas. Inferior to the left disc the retina seemed edematous. The nature of the patches was uncertain.

A biopsy of a submaxillary nodule was carried out. That night the patient died evidently in acute parathyroid poisoning.

Post-mortem examination revealed adenoma of the right inferior parathyroid gland, hyperparathyroidism with extensive skeletal demineralization, and generalized calcinosis.

Histologic examination of the globe showed plaques of calcium and bone formation in the sclera in the ciliary region, the region of the ora serrata, and behind the equator. One plaque involved the suprachoroid. There was a mild chronic inflammatory reaction in the uveal tissue. Amorphous calcium deposition was noted in the subconjunctiva at the limbus. One deposit formed a straight line which was continuous with Bowman's membrane, and Bowman's membrane was itself calcified for a short distance at the limbus. The calcification of Bowman's membrane was seen to become increasingly less definite axialward.

Conclusions

A woman who died of acute parathyroid poisoning with generalized calcinosis was found to have calcium deposition in the sclera, conjunctiva, and cornea. Her ocular fundi showed poorly defined pale-pink lesions deep to the retinal vessels and possibly related to the scleral calcium plaques either through transmitted pressure or as the result of local inflammatory response perhaps in the choroid. The patient's recurrent arterial hypertension was mirrored by the attenuation of the retinal arterioles. The only other note in the literature made of positive funduscopic findings in hypercalcemia is by Walsh,[3] who noted moderate hypertension and choroidal sclerosis of unusual severity in one of his cases.

The patient's complaint of photophobia and redness of the eyes is undoubtedly related to irritation from exposed calcium deposits at the limbus or in the subconjunctiva.

1777 Grand Concourse (53).

Acknowledgement is made of the assistance of Mrs. H. C. Wilder of the Armed Forces Institute of Pathology and of Dr. Samuel Gartner of Montefiore Hospital, New York, in the histologic interpretation of the globe.

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SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

May 4, 1953

DR. ABRAHAM L. KORNZWEIG, *President*

METHOD OF CONCORDANCE IN DIAGNOSING STRABISMUS

DR. JOSEPH I. PASCAL presented a paper on this subject during the instruction period.

NEWER CONCEPTS OF VERNAL CONJUNCTIVITIS

DR. FREDERICK H. THEODORE said that for many years it has been generally accepted that vernal conjunctivitis is a form of allergy. The recurring character of the condition, limited to the warm seasons, the tendency to involve young children, especially boys, the conjunctival eosinophilia, the history of both proved familial and personal allergies of other types, its ultimate disappearance, and now, the often dramatic response to cortisone therapy, all are highly suggestive of an allergic cause of the condition. Yet, despite very intensive work by many investigators, no material allergen has ever been shown to cause the disease. All that can be stated with assurance at the present time, therefore, is that vernal conjunctivitis occurs in atopic individuals.

It is perhaps worthwhile to take a somewhat broader viewpoint on the subject and consider another concept that may help in both the understanding and the treatment of this rather bizarre condition.

He suggested that vernal conjunctivitis is a form of physical allergy to the warm season occurring in an especially predisposed atopic individual. The general factors that predispose this individual may be endocrine, metabolic, allergic, and possibly infectious. In some way they all combine to condition the atopic person so that the warm season acts as a trigger mechanism setting off a sort of chain reaction precipitating vernal catarrh under the proper circumstances. On the other hand, elimination of any one factor may block the reaction and stop the process.

It is thus necessary to study patients with vernal conjunctivitis from a more general point of view taking all these possible idiosyncrasies into consideration.

Such a concept is in line with a more fundamental viewpoint of allergy in general, beyond the limits of demonstrable antigen-antibody responses. It is also consistent with the researches of Selye and others on cortisone and ACTH. Furthermore, it fits in with what is known about other physical allergies, such as that to light, where three main groups of factors, namely, (1) predisposing, such as infectious, metabolic or endocrine, (2) photodynamic, and (3) allergic mechanisms, all are called into play.

It is interesting that in conditions such as gout, hitherto not considered allergic in nature but, rather, metabolic, attacks have been precipitated in predisposed individuals, either by physical factors, such as chilling, or, if the individual has other allergies, by injections of known antigens.

If we realize how little we know about vernal conjunctivitis and start our investigations from a fresh point of view, we may eventually progress beyond the stagnant stage where Axenfeld left us almost 50 years ago. For background, Biegelman's recent book on vernal catarrh is highly recommended.

Discussion. DR. BERNARD KRONENBERG asked Dr. Theodore how he would explain the fact that after examination during winter and summer, a large number of Puerto Rican children had never shown a case of vernal catarrh.

DR. KNAPP said that vernal catarrh has

been studied at the New York Eye and Ear Infirmary. He mentioned a case of allergic conjunctivitis and keratoconus in the same patient. The majority of cases studied did not show an increase in eosinophils. A majority of the patients showed improvement after treatment with vitamin D and calcium. He also stated that, in his experience, the majority of these cases go on all year—not more during the summer. He asked what percentage of the cases improved after use of cortisone, and whether the symptoms increased after use of these drugs?

Dr. Fread said that we are still in the dark regarding vernal conjunctivitis. There is still much disagreement regarding its etiology. Dr. Theodore has pointed out a number of important facts—hormonal disturbances, autonomic nervous system disturbances, and so forth. There is a combination of certain kinds of ultraviolet rays (in certain climates) where these rays are different and therefore conjunctivitis may occur in certain areas only.

Dr. Kornzweig mentioned that he and two other doctors had tried exposing patients to ultraviolet and infrared light but could not reproduce the disease.

Dr. Theodore replied to Dr. Kronenberg that in Mexico there is a lot of vernal catarrh. To Dr. Knapp he said that there are cases in which just a little change can stop the process.

Ocular biomicroscopy

Dr. Milton L. Berliner and Dr. Goodwin M. Breinin presented a sound motion picture on this topic.

New operation for nystagmus

Dr. Alfred Kestenbaum said that, when a jerking nystagmus is present in primary position, causing either decreased visual acuity or tilting of the head, and if a spontaneous improvement cannot be expected, surgery is indicated.

He suggested measurement of how much the eyes have to turn in the direction of the slow phase till the nystagmus becomes a minimum one. The distance between this and the primary position, measured in millimeters, represents the nystagmus-number of this case.

Surgery consists of rotation of both eyes in the direction of the quick phase of the nystagmus. The rotation is made by resection and recession (or secured tenotomy) of the corresponding muscles. The extent of recession and resection has, each by itself, to equal the nystagmus number—seven-mm. recession plus seven-mm. resection render a seven-mm. rotation.

Dr. Kestenbaum presented two cases which were operated by this method. The first case had tilting of the head of 42 degree preoperatively, which was reduced to four degrees postoperatively. In the second case, the visual acuity was increased from 20/100 to 20/25 following surgery.

Bernard Kronenberg,
Recording Secretary.

SWISS OPHTHALMOLOGICAL SOCIETY

October 4 and 5, 1953

Tumors of eye and adnexa

Dr. G. Miescher (Zurich) analyzed his experience in radiation treatment of malignant tumors of the lids. Of 237 cases treated in 15 years, five-year cures occurred in 96 percent basocellular and in 84 percent spinocellular types. End results were cosmetically good in 75 percent and functionally good in nearly 90 percent. Significant precancerous lesions, such as senile hyperkeratoses, are easily and effectively cured.

Dr. M. A. Dollfus (Paris) noted that metastatic carcinoma of the choroid can be favorably influenced by irradiation but uveal sarcoma is radioresistant. In retinoblastoma, radium or cobalt 60 placed on the sclerotic over the tumor has given maximum success (20 percent cures). Of the epibulbar tumors,

spinocellular epitheliomas are radiosensitive, nevocarcinomas are radioresistant. Successful treatment of an orbital tumor requires preliminary biopsy. Circumscribed angioma, cylindroma of the lacrimal gland, lymphoma, and reticulosarcoma are radiosensitive. Possible complications of irradiation include cataract, iridocyclitis with glaucoma, and radio-induced sarcoma.

Dr. F. Rintelen (Basle) discussed retinoblastoma and cited three cases in which invasion of the cut end of the optic nerve was noted after enucleation. After intensive roentgenotherapy the cases were cured with no recidivation thereafter—seven, nine, and 19 years, respectively.

Dr. E. B. Streiff (Lausanne) stated that the success of surgical intervention depends on timing, technique, and the extent and penetration of the tumor.

Dr. H. Werner (St. Gall) advised that cancer of the medial palpebral angle is best treated with primary excision without trying preliminary irradiation.

Dr. K. Safar (Vienna) found that epibulbar melanoblastoma even though extensive can be successfully handled by electrosurgical technique with conservation of the globe.

Dr. R. Bernouilli (Basle) discussed a case that illustrates the clinical difficulty of distinguishing a true orbital tumor from an inflammatory pseudotumor. The patient, aged 58 years, had noted for two and one-half years a circumscribed mobile mass under the left orbital rim. A large painless preauricular gland was present and the sedimentation rate was accelerated. The tumor was removed without difficulty and histologic study made the unexpected diagnosis of inflammatory pseudotumor.

Dr. F. Koenig, Jr. (Zurich) has used contrast media for orbitography but warned that the procedure is too risky for clinical use.

Dr. A. Bangerter (St. Gall) reported a case of melanoma of the iris with invasion of the ciliary body and chamber angle in which the affected areas in the iris and ciliary body were successfully resected with maintenance of perfect vision. So far, nine months since operation, no reactivity has been noted.

Dr. R. Dufour (Lausanne) remarked that angioma of the choroid may simulate melanosarcoma. In an eye removed for a presumed melanosarcoma the surprising histologic diagnosis was a vascular nodule and hemorrhagic cyst.

Dr. H. Koelberg (Basle) spoke of Fabricius Hildanus (1560-1643), who in 1596 performed the first successful extirpation of an eye for malignant melanoma of the uvea.

Retinal detachment

Dr. H. R. Boehringer (Zurich) utilized lamellar scleral resection in 30 desperate cases of retinal detachment with successful results in six patients.

Dr. A. Bangerter (St. Gall) cited a case of retinal detachment with macular hole in which he had obtained an excellent restoration of visual function with a very simple procedure. After a small incision in the superior temporal conjunctiva, he placed a fragment of placenta in contact with the posterior pole. A slight inflammatory reaction ensured which sufficed to provoke reattachment.

Dr. M. Favre (Berne) described two cases of retinal detachment in myopes caused by a small hole in the peripapillary area, about three-fourths disc diameter from the disc border. The hole was invisible with the ophthalmoscope but could be seen with the slitlamp and contact glass.

Cataract

Dr. F. Marty (Geneva) reported a very rare form of congenital cataract in which dentate opacities appear between the embryonic and adult nuclei. Vision is not affected. A similar case is pictured in Vogt's *Atlas*. He would label it "cataracta uncinata internuclearis anterior."

Dr. J. Babel (Geneva) studied the lens

disturbance in the fetus of a diabetic mother and found changes similar to those he had previously noted in fetal specimens after maternal rubella.

Biomicroscopy

Dr. H. Goldmann (Berne) noted that by appropriate methods of observation Cloquet's canal can be traced in the normal adult.

Dr. E. Bürki (Basle) reported his second diagnosis of cystinosis by slitlamp examination of the cornea and conjunctiva. The superficial layers of these tissues reveal innumerable brilliant fine yellowish points. This early sign, first observed by Bürki in 1940, has been confirmed by many observers.

Dr. O. Knüsel observed that the lymphatic vessels of the conjunctiva can be rendered visible by the instillation of brilliant cresyl blue.

Dr. M. Amsler (Zurich) discussed a case of keratoconus which first appeared in one eye when the patient was a military recruit, aged 20 years. The beginning of keratoconus was observed 11 years later in the other eye demonstrating that the condition was of a hereditary nature and not acquired.

Perimetry

Dr. H. Harms (Tübingen) explained his technique of quantitative perimetry in determining disturbances of the optic pathways and noted its usefulness especially in intra- and juxtasellar tumors.

Dr. F. Gafner (Berne) found that the technique of mapping angioscotomas would reveal Bjerrum's scotoma in its incipiency.

Antibodies in aqueous humor

Dr. H. Goldmann and Dr. Witmer (Berne) proved experimentally that, when tuberculosis in the rabbit or leptospirosis in the horse affects the eye only, the antibody content in the aqueous is higher than that in the blood. This would indicate that specific antibodies are formed by the inflamed uveal tissue.

Miotics in treatment of concomitant strabismus

Dr. A. Huber (Zurich) used Mintacol (Bayer, 0.5 percent) for instillation in the mornings in convergent strabismus when the condition was intermittent or commenced relatively late. The method can be used either as a substitute or as a supplement to glasses.

Retrociliary perforating diathermy

Dr. G. Maeder (Geneva) reported 51 cases of glaucoma of all types in which eight to 12 transconjunctival diathermic punctures were used, equally distributed in the four quadrants at seven mm. from the limbus. Postoperative reactions were minimal and the results were good in 88 percent. This procedure would seem indicated in glaucoma simplex with restricted field, infantile glaucoma, and the secondary glaucoma associated with aphakia, keratoplasty, and uveitis.

Eales' disease

Dr. A. Franceschetti and Dr. S. Forni (Geneva) treated five patients with Eales' disease in which the companion eye showed periphlebitis but no vitreous hemorrhage with trans-scleral diathermy as a prophylactic measure, with apparent success.

Electroretinography

Dr. P. Dieterle (Geneva) found that the electroretinogram was about normal in the secondary types of tapetoretinal degeneration, whereas primary retinitis pigmentosa is characterized by a constant absence of the b-wave, and hence the electroretinogram could serve as a means of differential diagnosis.

John D. Blum (Geneva),
Correspondent.
James E. Lebensohn,
Translator.

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STANDARDIZATION OF TONOMETERS

The accurate determination of intraocular pressure necessitates a reliable tonometer. Of 50-odd instruments devised for this purpose, the simply constructed and easily used Schiøtz tonometer has achieved the greatest popularity. While Schiøtz was living, the tonometers manufactured by his instrument maker carried a certificate that they were replicas in construction and performance of the reference standard instrument. As time passed and the manufacture of "Schiøtz tonometers" spread to other countries, the reproduction of the original Schiøtz design became increasingly faulty and instruments produced by different reputable manufacturers gave widely divergent readings on the same eye.

In 1923, Arnold and Karpow of the Uni-

versity of Tübingen initiated the checking of tonometers by a tambour manometric device and their method of certification still persists in Germany. Kronfeld has found that no confidence can be placed in this oversimplified test as only 25 percent of imported Tübingen-certified instruments came within the acceptable range of the present American certification procedure. Other efforts to check tonometers were made by Comberg in 1928 and by the International Congress of Ophthalmology in 1929. In America, Posner in 1935 was the first to introduce a tonometer-checking station, a project continued with Schoenberg later under the auspices of the National Society for the Prevention of Blindness. But the full scope of the problem and its final solution were realized only after the American Academy of Ophthalmology and Otolaryngology established, in 1942, at the suggestion of Jonas S. Friedenwald, a Committee on Standardization of Tonometers. The exceptional accomplishments of this committee, partially summarized in the 177-page Decennial Report recently published, present a co-operative achievement seldom equalled in the history of medical science.

A survey showed that the readings of a properly constructed Schiøtz tonometer on normal eyes should average 24 mm. Hg with a plus or minus variation of 5.0 mm. Testing stations for the rehabilitation and recalibration of aberrant tonometers were established in New York, Chicago, San Francisco, and São Paulo, Brazil, under the direction of committee members Posner, Kronfeld, Harrington, and Alvaro, respectively. An independent similar station was later set up in Canada, and another recently in Great Britain. The testing stations are on a self-supporting basis and currently charge $5.00 for service. Of more than 1,500 tonometers checked, over 80 percent were found grossly divergent from the original Schiøtz pattern.

Among the considerations for following the official specifications of the Schiøtz tonometer were the meticulous calibrations made by its originator for over 20 years. At the testing stations, 28 measurements were made of which 14 were found to affect materially the tonometer reading. The most critical items were the weight of the plunger assembly, the diameter of the plunger base, and the plunger edge profile. A plunger assembly weight of 8.0 gm. instead of 7.5 gm. required an over-all correction of 0.5 scale unit. The diameter of the plunger was officially 3.0 mm.; a difference of only 0.05 mm. caused the tonometer reading to change 0.62 scale units. Schiøtz had the plunger edge rounded to a radius of 0.25 mm.; a variation in this curvature introduced an error of 0.2 scale unit per 0.1 mm. deviation in radius. Since many structural aspects of the Schiøtz tonometer had been inadequately specified in the original description, a new reference standard was especially constructed for the committee by the Sklar Manufacturing Company.

Tonometric measurements reflect the combined influence of intraocular pressure and ocular rigidity. The calibration of Schiøtz failed to consider adequately this latter factor. Ocular rigidity is defined as the resistance which the eyeball offers to the fluid displacement effected by the tonometer. K, the coefficient of rigidity, can be calculated from two tonometric measurements on the same eye with different plunger loads. Its average value is 0.0215. On the basis of Friedenwald's studies a Standard Chart for the Schiøtz tonometer was adopted with revised scale readings for the 5.5-, 7.5-, 10-, and 15-gm. weights (Tr. Am. Acad. Ophth., **52**:258, 1948) in which the final Schiøtz chart of 1924 was modified to ensure concordant measurements with different loads for eyes with average ocular rigidity and average corneal radius.

Though marked deviations from average ocular rigidity are rare in both normal and glaucomatous eyes, their detection is of signal diagnostic importance. In a nonglaucomatous eye excessive rigidity may give a misleading tonometric estimate as high as 37 mm. Hg; on the other hand, the readings in glaucoma

with "low tension" may result simply from low ocular rigidity. Using the 1948 Standard Chart, if the estimate given by two plunger loads is in good agreement, the ocular rigidity may be considered approximately normal. If the estimate obtained with the 10-gm. weight is higher than that with 5.5 gm., it indicates an ocular rigidity greater than average so that the true intraocular pressure must be lower than either reading; and vice versa. The actual intraocular pressure and the coefficient of rigidity can be determined by referring paired readings of different loads, 5.5 and 10 gm. or 7.5 and 15 gm., to Friedenwald's numerical chart (*Standardization of Tonometers*, Decennial Report, 1954, pp. 142-143). This latest scale, based on his most recent studies, is by coincidence close to the Schiøtz calibration of 1908 and gives readings 3.0 to 6.0 mm. lower than the 1948 Standard Chart. Workers in tonography find that this calibration gives the closest approximation to the true intraocular pressure and it probably will replace eventually the 1948 chart in clinical tonometry.

All reputable American manufacturers of tonometers now adhere to the specifications of the committee and submit their instruments for certification to an impartial agency, the Electrical Testing Laboratories of New York City. Its certificate shows the identifying serial numbers of both the instrument and the plunger. From 1946 to 1951, nearly 4,000 tonometers have been certified. With present tolerances the standard deviation for a single tonometer reading with a randomly selected certified tonometer is 0.36 scale unit, which is quite within the clinical error of measurement. The possibility of interconvertible readings with different certified tonometers is certainly a definite aid in consultation and institutional work. It is regrettable, however, that so many certified tonometers omit the 15-gm. weight. In accord with this practice the reproduction of the 1948 Standard Chart in Hughes' recent *Office Management of Ocular Diseases* deletes the readings for this weight. But the 15-gm. weight is a most valuable accessory; with it no tension is so high as not to register on the scale, and only with it can the ocular-rigidity table be fully utilized.

To quote Friedenwald: "No one is compelled to submit his product for certification. No one is forbidden to market uncertified instruments." The committee's policy, though wholly educational, noncoercive, and truly democratic, has been so effective that ophthalmologists in increasing numbers are insisting on certified tonometers. Because of its liberal and scientific attitude the project of standardization not only did not interfere with further improvements in tonometers and tonometry but, as a happy by-product, actually stimulated remarkable progress. Alterations in the design of tonometers were welcomed providing the new features maintained authentic readings, reliable specifications, and close tolerances. Conversion scales were established by which the readings of the McLean and Schiøtz X-tonometers could be translated into those of the standard Schiøtz instrument.

The noteworthy advances in tonometer construction include the production of a new standardized model of the Gradle tonometer, the Sklar modification of the Schiøtz instrument, the Harrington tonometer, and the electronic tonometer. The Sklar modification introduced a mirrored back to the scale for avoiding reading parallax and an epicycloid hammer in the lever mechanism to insure a uniform magnification ratio. In the Schiøtz tonometer the lever magnifies the movement of the plunger 20 times so that a corneal indentation of 0.05 mm. is equivalent to one division on the scale or 1.0 mm. Hg. The large clock of the Harrington tonometer gives four times this magnification. In clinical use a circle of fluid is seen beneath the transparent plastic footplate and its central position indicates accurate central and vertical placement of the tonometer. The Mueller electronic tonometer dispenses with the lever mechanism of the Schiøtz instrument. The movement of the plunger is registered instead

on a galvanometer through changes in the electrical current passing from an induction coil within the cylinder. Studies with this instrument led to tonometry and a significant new use for the tonometer.

James E. Lebensohn.

APOLOGY

In the February, 1954, number of THE JOURNAL, there is an article by D. A. Saggese, "The fundus in tuberculous meningitis in children." It has reached my attention that the illustrations accompanying this paper were taken directly from the article, "L'examen ophthalmoscopie dans la méningitis miliare de l'enfant" by Debré, Monbrun, Thieffry, Brissaud, and Lavat, published in the *Archives d'ophtalmologie*, 8:9, 1948. Dr. Saggese did not give proper credit for these pictures. Furthermore, he had removed the artist's name from them and reversed the plates. In addition, the legends accompanying the illustrations are, in certain instances, either direct translations or paraphrased translations of the legends to be found in the article by Debré, et al. There is likewise no direct reference by Saggese in his text to this fine contribution of Debré and co-authors.

Dr. Saggese's explanation for his action is considered by me to be unsatisfactory. Hence, I find it necessary here to apologize to our readers for publishing this article through sheer ignorance on my part of the existence of the Debré contribution.

Derrick Vail.

DEDICATION OF THE PROCTOR LABORATORIES

The dates of September 29th to October 1st are important in the history of the Department of Ophthalmology of the University of California at San Francisco, California. They marked the formal dedication ceremonies of the new 3,000 square-foot research laboratory.

Thirty-five years ago, a very young man in the then Subdivision of Ophthalmology dared to daydream about the future in which he visualized a pathology and research laboratory in ophthalmology. With the dedication of the new laboratories that boy, now an older and humbler man, has seen the realization of that dream. It far exceeds even his fondest hopes.

In 1946, Mrs. Elizabeth C. Proctor's representative approached the chairman of the Department of Ophthalmology of the University of California School of Medicine to discuss the possibility of establishing a research foundation. The offer was contingent on the willingness and ability of the Regents of the university to provide 3,000 square feet of space for the proposed laboratories. The provision of this space was facilitated by the generous donation of $65,000 by Mr. and Mrs. Berthold Guggenhime, and on September 15, 1947, Mrs. Proctor and the Regents of the University approved the agreement that established the Francis I. Proctor Foundation for Research in Ophthalmology.

Pending the construction of the new Medical Sciences Building, the Foundation has been housed in the E. S. Heller Laboratories which were donated in 1951 for research in ophthalmology. The majority of the Foundation's research activities have been in the fields of pathology and microbiology. Its staff members have published 51 articles.

The new laboratories are on the third floor of the new Medical Sciences Building which adjoins the Out-Patient Department in the Clinics Building where the Eye Clinic is situated.

The dedication ceremonies were preceded by the formal unveiling of a portrait of Dr.

Frederick C. Cordes, chairman of the Department of Ophthalmology, on Tuesday evening, September 28th. The portrait was donated by staff members and former residents who were trained by Dr. Cordes in honor of his 20 years of service as chairman of the Department. This portrait, which was given to the University of California School of Medicine, will be hung in an appropriate location in the new buildings, either the Medical Sciences Building or the Herbert C. Moffitt Hospital.

An informal Open House for inspection of the laboratories was held during the entire day of Wednesday, September 29th. In the morning, Regent Earl J. Fenston formally delivered the keys of the laboratories to the director, Dr. Michael J. Hogan, clinical professor of ophthalmology. Following this ceremony, the guests inspected the various laboratories to view the exhibits and demonstrations:

Dr. Phillips Thygeson
Dr. Samuel J. Kimura
Material to be included in an *Atlas of External Diseases* which is in preparation.

Dr. Samuel J. Kimura
Number of cases of corneal ulcers caused by fungi.

Dr. William K. McEwen
Dr. Samuel J. Kimura
Principles and results obtained by filter-paper electrophoresis of tears.

Dr. Karl Boyer
Miss Anita Suran
Techniques employed in studies on the removal of vitreous hemorrhages. Effect of various chemical agents on the rate of red blood cells tagged with radiochromium.

Dr. Daniel G. Vaughan
Results of some studies on the sterility of ophthalmic solutions.

Mrs. Helenor Wilder Foerster
Sections of eyes from uveitis patients showing toxoplasmosis as the specific agent.

Dr. Michael J. Hogan
Miss Ann Lewis
Miss Diana Ides
Microscopic preparations of typical positive and negative Toxoplasma methylene-blue dye tests. The characteristics of the toxoplasmic lesions in the viscera and brain of rabbits and mice.

Dr. Levon K. Garron
Mr. Ben Goldfeller
Unusual pathologic specimens; clinical pictures and photographs from slides of pathologic material removed in the cases.

Miss Sylvia Ford,
staff artist
A number of drawings of interesting and unusual cases on exhibit in the Proctor Library.

Presentation of papers took place at the Morrison Auditorium of the Academy of Science Building, in Golden Gate Park, a short distance from the University of California School of Medicine. Following registration, the chairman of the Department of Ophthalmology, Dr. Frederick C. Cordes, gave a short address of welcome together with a short history of the Proctor Foundation. Following a few remarks by Dr. Michael J. Hogan, director of the Foundation, Dr. Phillips Thygeson and Dr. Alson Braley accounted some of their reminiscences of their contact with Dr. Francis I. Proctor.

The opening papers by Dr. Alan Woods, Dr. Frederick Verhoeff, and Sir Stewart Duke-Elder were devoted to the historical background of research in ophthalmology here and abroad, as well as the development and progress of ophthalmic research up to the present day. All three papers were remarkable in their perspective and were enthusiastically received.

Prof. A. Franceschetti of Geneva, Switzerland, presented an interesting paper on "Heterochromic cyclitis" with a discussion of his findings in almost 60 cases and a description of the complications. He also described a number of cases of bilateral heterochromic iridocyclitis.

Dr. Jonas S. Friedenwald of The Johns Hopkins Medical School discussed "Carbonic anhydrase inhibition and aqueous flow." He presented the results of his studies and observations on the possible biochemical mechanisms of action of carbonic anhydrase on reduction of aqueous flow, the development of a refractory state to this enzyme, and the influence of acidosis and alkalosis on its action.

Dr. Georgiana Theobald of the University of Illinois presented "Anatomic studies on the canal of Schlemm," with evidence of collector channels leading from the anterior chamber to the canal through the trabeculas.

Dr. Hugh Ormsby of the University of Toronto gave a detailed study of several thousand newborn infants with regard to ophthalmia neonatorum. He concluded that we should not be too hasty in changing from the use of time-honored silver nitrate to the use of antibiotic medications.

Dr. Algernon B. Reese, College of Physicians and Surgeons, Columbia University, gave a paper on "Precancerous and cancerous melanosis of the conjunctiva," indicating that this condition was difficult to treat when present in the diffuse state. He showed interesting serial follow-up pictures of a case of melanosis of the conjunctiva which was followed for a number of years. The spontaneous exacerbations and remissions in the lesion were remarkable.

Dr. S. Rodman Irvine, of the University of California School of Medicine at Los Angeles, gave some interesting data on the physical state in studies of the vitreous as determined by newer investigative methods. These findings indicated that the vitreous gel might be constituted in a different state from that previously considered.

On Thursday evening, Dr. Ludwig von Sallmann, director of research in ophthalmology, College of Physicians and Surgeons, Columbia University, gave the Ninth Francis I. Proctor Lecture. The title of his paper was "The responses of intraocular and blood pressure to electric stimulation of the diencephalon." The lecture was attended by a large number of ophthalmologists, as well as many people from other departments of the School of Medicine. It was presented beautifully and well received.

On Friday morning, October 1st, Dr. Derrick Vail of Northwestern University Medical School at Chicago, presented a paper and film on "Surgery of the dislocated lens." He described and depicted in detail the technique involved, originally described by Lieut. Col. Henry (Jullundur) Smith in India.

Dr. Giambattista Bietti, of the University of Parma, Italy, discussed some interesting aspects on "Some recent contributions to the problem of trachoma." He discussed the variation in the disease from a geographic standpoint, its appearance in various age groups in different countries, and some information on serologic aspects. He also talked about the long-term therapy with long-acting intramuscular penicillin and the problem involved in mass treatment of backward races.

Dr. Kenneth Swan of the University of Oregon Medical School gave an excellent paper on "Congenital entropion and hypotropia," a combination previously not discussed in the literature. Photographs of this condition were shown and its management discussed.

Dr. M. Puig Solanes of Mexico City, made a detailed correlation between the ophthalmoscopic findings and the necropsy findings in 90 patients with essential hypertension, hypertension due to chronic glomerulonephritis, and other diseases. He concluded that the ocular findings were almost identical in all groups of hypertension and that there was no correlation between the intensity of retinal angiosclerosis and cerebralvascular sclerosis.

Dr. Peter Kronfeld of the University of Illinois at Chicago described the "Tonographic studies of the glaucoma secondary to delayed restoration of the anterior chamber." The findings nicely demonstrated the obstruction to outflow in these cases and the relationship to development of peripheral anterior synechias.

Dr. Norman Ashton, of the University of London, England, gave an excellent paper on "Retrolental fibroplasia" and presented an outstanding film of the toxic effects of oxygen on the developing vasculature of the kitten's retina. It was beautifully demonstrated that oxygen toxicity results in immediate obliteration of the retinal blood supply.

Dr. Josef Böck of Graz, Austria, presented

the results of "Further investigations on the anatomy of the origin of the ophthalmic artery." This interesting presentation was accompanied by some excellent photographs.

Dr. David Cogan of the Howe Laboratory, Harvard Medical School, described the "Conjunctival implants in the rabbit anterior chamber," and showed that there is survival, providing the implant is in contact with the iris.

Col. John H. King, Jr., of Walter Reed Army Medical Center, in his paper on "Nutritional amblyopia," described the results of a survey of a group of soldiers who were interned during the recent Korean conflict. A number of cases of nutritional amblyopia were encountered and studied by the use of electroretinograms. He was able to show that the visual damage in this group of patients with beri-beri resulted from lesions in the retina itself. He also found no correlation between the visual acuity and fields, and the ophthalmoscopic appearance of the disc.

Luncheon was served to the guest speakers and the staff of the Department of Ophthalmology in the Red Room of the Bohemian Club on Thursday and Friday, which gave both the staff and the distinguished visitors an opportunity for informal discussions.

On Wednesday night, Dr. Hogan gave an informal dinner at his home for the visiting guest speakers and their wives.

On Friday night, October 1st, a banquet was given for the guest speakers, the staff, and their wives at the Bohemian Club. The famous chef of the Bohemian Club outdid himself to prepare an unusual dinner. It is customary at a banquet such as this one that the feast be followed by numerous speeches. However, after three weeks of papers and banquet speeches that most of the guests had gone through, it was felt that the group might appreciate the omission of these dinner orations. Consequently, it was decided to follow the banquet by the re-creation of one of the "Campfire Shows" the Bohemian Club has every evening during the week as part of its summer encampment in the "Grove" among the giant redwoods. This dinner, ending with the valediction of old Spanish California "hasta la vista" (until we meet again) was a never-to-be-forgotten affair.

The insignia of the Francis I. Proctor Laboratory is of interest. This was derived from the ancient Egyptian symbol known as the "wedjat-eye" or "sound-eye" (that is, uninjured eye) of Horus. The symbol is derived from the ancient myth in which the eye of the falcon-god Horus was torn into fragments by the wicked god Seth. Later, the ibis-god Thoth miraculously restored the injured eye by joining together its parts, whereby the eye regained its title the "sound-eye" or "wedjat-eye." It is a symbol of very great antiquity familiar to the world's first ophthalmic specialists of Egyptian medicine.

The establishment of the Proctor Laboratories, which followed the development of the E. S. Heller Pathology Laboratory in 1942, was later followed by the opening of the Research Laboratory in Ophthalmology of the University of Oregon, and the Doheny Laboratory for Research in Ophthalmology in Los Angeles. These three centers definitely establish research in ophthalmology on the Pacific Coast, and it is hoped that, in the not too distant future, the Pacific Coast will take its place as one of the important ophthalmic centers of our country.

Frederick C. Cordes.

OBITUARY

IGNATIUS G. SOMMERS, M.D.
1894-1954

Dr. Ignatius G. Sommers was born in Vienna, received his medical degree at the University of Vienna, and served as assistant to Professor Sachs in ophthalmology from 1925 to 1927, and assistant to Professor Alexander from 1927 to 1932. In 1938 he came to the United States and in 1944 acquired his American citizenship.

Dr. Sommers was a diplomate of the American Board of Ophthalmology and the American Board of Otolaryngology. With E. A. Speigel, he was co-author of the textbook,

Neurology of the Eye, Ear, Nose, and Throat, and he was author of *Histopathology of the Eye*. He was assistant professor of ophthalmology at the Medical School of the College of Medical Evangelists in Los Angeles and, to this institution, he willed his body and all his laboratory equipment and vast collection of slides.

Dr. Sommers was loved by his colleagues for he was an humble and forthright man with a ready smile and a word of cheer for those who needed encouragement. He leaves a devoted wife, Vita Stein Sommers, Ph.D., a psychologist who, through her husband's influence, became interested in the blind and serves as counselor to parents of blind children.

S. Rodman Irvine.

CORRESPONDENCE

Lacrimal-sac obstruction

Editor,
American Journal of Ophthalmology:

In the interesting article by Fritz Nelson, M.D., in The Journal of November, 1953 (**36**:1587), and the "Ophthalmic Miniature" from Carl F. S. Crede (**36**:1590 (Nov.) 1953), there is no mention of the prophylactic measure to be taken against lacrimal-sac obstruction at birth, as we were taught it at Sloan Hospital, New York City, over a quarter of a century ago; that is, as soon as the baby's head has emerged, and while the shoulders are still on the perineum, the eyes should be wiped with boric acid on a ball of cotton to prevent sucking of mucus into the sacs when the baby first opens its eyes. This must be supplemented by the $AgNO_3$ treatment after delivery. But the importance of that first wiping away of mucus was emphasized. I have never seen it mentioned anywhere in the literature.

I should like to ask whether some of these so-called "congenital obstruction" cases could not be instead an obstruction resulting from the mucus blocking the ducts in some infants not so treated. We were taught that this simple but prompt prophylactic measure would prevent sac trouble in the babies later.

(Signed), M. Pauline Jeffery, M.D.,
Buffalo, New York.

BOOK REVIEWS

VOLUME VI

In spite of 22 sad and cataleptic years, from the Great Depression through World War II, the welfare state and siege economy, alarms, excursions, emergencies, Korea, the A & H-bomb menace, and the communistic threat, unhappy and tension-provoking years, *Volume VI* emerges triumphant, nearly to complete the seven volumes that were projected long ago by the sparkling genius, Duke-Elder. The six volumes that have already appeared are a thrilling and heartening example of what has been achieved by a most uncommon man, working nearly alone, in these disturbing days, the age of the common man whose aura is that of bureaucracy, socialism, hatreds, and mediocrity.

In this volume, the author, with his usual most remarkable skill of assembly, discusses the nature and incidence of ocular injuries in beautiful, flowing prose. The first part consists of chapters on mechanical injuries and covers the subjects of concussion and contusions, wounds, retained foreign bodies, multiple explosions and gunshot wounds, and the indirect effects of mechanical injuries. The second part consists of nonmechanical injuries (thermal, ultrasonic, electrical, radiational, chemical, and stress injuries).

Volume VII will comprise medical ophthalmology and the index to the complete set. It is in press and will soon appear.

Seemingly, however, Duke-Elder's work is never done. Even before *Volume VI* was published and *Volume VII* in print, he began the arduous but most important task of revising and bringing up to date the fundamental first volume (*The Development, Form, and Function of the Visual Appa-*

ratus) that appeared in 1932 and properly excited the whole world of ophthalmology. This volume, as well as its subsequent reprint, has long been out of print and copies of it have been most difficult, if not impossible, to find. In addition, in the last 22 years, countless advances have been made in our knowledge, especially of the function of the visual apparatus, and all of these findings must be sifted and those found worthy incorporated in the new edition of *Volume I*.

So like Sisyphus, the son of Aeolus and Enarte, Duke-Elder has an endless task to perform. It will be recalled that Sisyphus, famed as the craftiest of men, while temporarily confined in the underworld, was compelled to roll a big stone up a steep hill. Before it reached the top of the hill, the stone always rolled down and Sisyphus had to begin all over again. *Volume VI*, by an equally wise man, who is temporarily confined to this world (we hope for a very long time to come) has reached the top of the hill but *Volume I* has rolled down it and must be pushed back to the top, probably meeting *Volume II* on its way down, and so on ad infinitum.

What a marvelous thing for one man to accomplish in a generation, some five years of which were completely lost to him because of World War II in which he served with complete distinction. We can compare this Great Cham of Ophthalmology to the Great Cham of Literature, Samuel Johnson, who took eight years to complete his superb *Dictionary of the English Language*.

Referring to the *Dictionary*, Boswell records the following event that occurred in 1747. Johnson's friend, Dr. Adams, expressed astonishment and said:

"But, Sir, how can you do this in three years?"

Johnson: "Sir, I have no doubt I can do it in three years."

Dr. Adams: "But the French Academy, which consists of 40 members, took 40 years to compile their dictionary."

Johnson: "Sir, thus it is. This is the proportion. Let me see, 40 times 40 is 1,600. As three (actually eight) is to 1,600, so is the proportion of an Englishman to a Frenchman."

The comparison is this. The splendid *Traité d'Ophtalmologie*, consisting of eight volumes appeared in 1939. We do not know how long it took to put it together by its 103 collaborators who were French, Belgian, and Swiss. It took Duke-Elder, all by himself, 22 years to complete his *Textbook*. Assuming the most favorable time (one year) for the French-writing ophthalmologists, the proportion is this: 103:1 = 1:22, which works out that one Scotsman is equivalent to 4.6 lingua françonians.

Arnold Toynbee, another Britisher, has covered in his nine-volume *Study of History* the story of the entire world. He took over 20 years to do it and used 3,150,000 words. Duke-Elder took 6,912 pages, 6,312 illustrations, and 3,413,888 beautifully chosen words to tell the story of ophthalmology. Thus it is that the importance of ophthalmology is greater than that of the entire world by 263,888 words.

For his great achievement, Sir Stewart has already received most, if not all, of the honors and prizes the world has to offer ophthalmology. From the United States, he has received an honorary degree (D.Sc.) from Northwestern University, the Distinguished Service Medal of the Section on Ophthalmology, A.M.A., and the Howe Medal from the American Ophthalmological Society. He has been made an honorary fellow of the A.M.A., the American College of Surgeons, and an honorary member of Alpha Omega Alpha. In Europe, he has received the Donders Medal and honorary degrees from the Universities of Dublin, Utrecht, and Strasbourg. He was made an honorary fellow of the Royal College of Surgeons, Edinburgh. More recently, he was given an honorary degree from McGill University, and received the Gonin Medal a few weeks ago at the XVII International Congress of Ophthalmology. No doubt other honors have been

given him of which I am ignorant. No doubt, too, there will be many more yet to come. He deserves them all. We salute this superior man of our generation. We are grateful to him beyond measure, and all of us, now and those who come after, will remain in his debt for the knowledge he has provided for us.

Derrick Vail.

TEXTBOOK OF OPHTHALMOLOGY, VOLUME VI: INJURIES. By Sir Stewart Duke-Elder, K.C.V.O., etc. St. Louis, C. V. Mosby Company, 1954. 1194 pages, 1145 illustrations, including 144 in color, references, index. Price: $25.00.

BULLETIN DES SOCIÉTÉS D'OPHTALMOLOGIE DE FRANCE. Paris-Limoges-Nancy, Charles-Lavanzelle, Imprimeries, 1953.

At the November, 1953, session, M. Fessard presented a paper on the physiologic and biochemical aspects of nerve stimulation and conduction, stressing the microphysiologic studies of Granit and recent publications by Kuffler. The main topic of the meeting was the surgical treatment of concomitant strabismus. The writing of the report had been assigned to D. Parfoury; because of his untimely death the report was read by his devoted friend and disciple Louis Polliot. Four other papers were related to the main topic. G. Offret and G. Lombard made a statistical study of the medical and surgical treatment of concomitant squint and recognized the possible favorable results of orthoptic training. F. Willot and P. Leurent delineated their methods of anesthesia in very young children. Leurent described a case of monocular depressor paralysis, cautioned against overlooking a supranuclear lesion, and commented favorably on the surgical techniques of Berke, Malbran, and Fink. C. Thomas gave a detailed description of an unusual surgical procedure which he called "transposition of the globe."

P. Pesme showed a girl, aged 19 months, with gargoylism. R. G. Julien treated a case of "allergic hyalitis" successfully with oral cortisone after the local cortisone therapy was ineffective. J. Teulieres reported on a case of nevo-carcinoma of the ciliary body in an eight-year-old child who was well three years after enucleation and the case of a 30-year-old woman who had had an iris sarcoma removed by iridectomy when she was one year old.

Galmettes, Deodati, Delfour, and Daraux discussed retrolental fibroplasia. Valiere-Vialeix and A. Robin talked on lamellar scleral resections after Paufique's technique and analyzed the case histories of seven unsuccessfully treated patients.

J. Legrand suggested the use of Fritz's contact lens or Walser's contact shells to prevent astigmatism after perforating keratoplasty.

At the meeting of December 19, 1953, J. Offret and H. Durant described monocular glaucoma in a nine-year-old child with anomalies of the iris and normal chamber angle. Pilocarpine had been used since the patient was four years old.

M. Onfrey reported on the changing clinical picture of an isolated choroidal tubercle which could be examined regularly and which healed completely under streptomycin treatment in about two years. Pierre Desvignes, J. B. Baron, and LeVan Nham recommended the intravenous injection of P_{32} and registration of the beta irradiation as found with the Geiger counter in masked parts of the eyeball. Twelve patients were examined, three eyes contained malignant growths.

J. Legrand gave a preliminary report on acrylic discs in corneal transplants. André Baron undertook a systematic study on the tolerance of the eyeball to plastic material. He described different types of corneal discs and acrylic lenses, methods of insertions, normal reactions of the ocular tissues, and complications.

C. Veziris and A. D. Hirschberg observed cyclic subconjunctival hemorrhages in a woman 60 years of age. The hemorrhages

were stopped after male hormones were prescribed. The basis of the possible effect of such a treatment was studied.

Jean Sedan contributed a very valuable essay on the surprising therapeutic results of nitrogen-mustard in a severe case of iridocyclitis in a young woman with Hodgkins disease. Mme. Pigasson reported on the surgical results in four patients with posttraumatic paralysis of various eye-muscles.

Alice R. Deutsch.

Bulletin de la Société Belge d'Ophtalmologie. Imprimerie medicale et scientifique, 1954.

R. T. Branbergen injected air into the anterior chamber before trying a routine cataract extraction in a patient with chronic iridocyclitis and iris bombé instead of making an incision ab externo, a method preferred by most of the discussers in similar cases of cataract with absent or very shallow anterior chamber.

Y. Delmarcelle's, E. Prijot's, and R. Weeker's paper on the action, indication, and techniques of the antiglaucomatous iridectomy contains fundamental concepts pertinent to the pathogenesis of this disease. A. Fritz contributes several instructive graphs on the interrelationship of intraocular pressure and capillary pressure in the uvea. J. François, M. Rabaey, and O. Deoeir describe a case of an eosmophilic granuloma in the soft tissue of the orbit and review the literature, pathogenesis, prognosis, and treatment of this rare disease. De Jaeger and Bernolet discuss amblyopia in the cross-eyed child.

J. Kluyskens gave an account of a highly technical comparative study of inverted visual fields in neuropsychiatric patients and simultaneous electro-encephalographic tests.

J. François and G. Verniez examined the visual functions in three cases of retinal elastosis. They found an elective hemeralopia of the posterior pole on scotopic campimetry and an occasional subnormal electroretinographic response. J. François, M. Vanderstraeten, and A. Neetens delineate retinal changes in oxygen therapy and compare the hemodynamics of the retina during oxygen use in severe emphysema with the retinal changes of premature infants who had been exposed to high concentrations of oxygen. J. François and A. Derouk read a stimulating paper on electroretinography of diabetic and hypertensive retinopathy and the effect of green and blue filters and of vasodilatation on the electroretinogram.

DeLaet and Mme. Bayet describe a peculiar cuff formation in two cases of occlusion of the retinal artery of different etiology.

Alice R. Deutsch.

Bulletins et Memoires de la Société Française d'Ophtalmologie. Paris, Masson et Cie. 455 pages.

This year, the "rapport," which, as customary, was published in book form and was sent to the members one month before the meeting, was devoted to gliomas and pseudogliomas. It was written by Dr. M. A. Dollfus and Dr. B. Auvert. H. B. Stallard described a special scleral applicator for radon-seeds with which he limited the efficient radiation to the tumor area. A. Mercier advised beta irradiation in early retrolental fibroplasia. M. Paufique called attention to the occurrence of sarcomas many years after X-ray therapy and he considered Stallard's methods to be less hazardous. A. B. Reese, who presided at this session, reported on his modifications of the X-ray treatment and on the use of triethylene-melamine which, when used concurrently, allowed him to reduce the effective X-ray dose. Other participants in the discussion were Sabbadini, Nordman, Sedan, Hartman, Zanen, Franceschetti, Larmande, and Heinz.

V. Cavka of Sarajevo, Jugoslavia, distinguishes two groups of retinitis pigmentosa. F. W. Law (England) gave a preliminary report on the relationship between facial asymmetry, ametropia, anisometropia, hetero-

phoria, and strabismus. Valiere-Vialeix and Robin describe Zarcycki's lacro-dacryostomy and their own modifications with which they have had good results in canalicular stricture. Dario Sabbadini (Milan) advised preventive diathermy in cases of retinal tears and areas of retinal degeneration without detachment. Dubois-Poulsen and C. Magis stated that the Bjerrum-scotoma and Rønne's step, field changes characteristic for glaucoma, are met in various diseases, such as chiasmatic lesions, optic neuritis, and choroiditis.

G. R. Hoffman read an instructive paper on angiography and its diagnostic value in suprasellar tumors. P. Bregeat, H. Fischgold, and M. Davis called attention to X-ray changes on the anterior clinoid process and their significance in intracranial tumors and vascular anomalies. Druault-Toufesco favors the allergic etiology of sympathetic ophthalmia. He considers general supportive treatment essential.

C. Thomas, J. Cordier, and B. Algan discuss conjunctival lesions due to Pasteurella septica, including a typical case of their own. Aureomycin was their treatment of choice.

P. Toulant and A. Larmande stressed the insiduous hazards of Koch-Weeks conjunctivitis which accounted for about 60 percent of blindness in North Africa. The Koch-Weeks bacillus also aggravates trachoma.

R. Nataf and P. Delon (Tunis) identified two lymph ducts of the conjunctiva, namely, a descending pericorneal temporal collector, emptying into collectors of the external angle and a recurrent supernasal duct, running to the internal angle. The studies were made under the slitlamp, using a selective staining.

M. Alvaro (São Paulo) described his pterygium operation. He always combines surgery with beta irradiation. He uses routinely four applications for three minutes at intervals of five days; if necessary he repeats the series once more after 30 days.

J. Jonquères and G. Gaillard review their experiences with conjunctival transplants in diseases of the conjunctiva. Beauvieux and P. Pesme report a case of symmetrical lipoma of the conjunctiva and discuss eight similar cases, published previously. Renard, Laliere, and Mazel used cartilage to replace a scleral defect in a case of perforating scleromalacia.

Viallefont, Paycha, and Boudet report their investigations on the pathogenesis of the corneal endothelium in diseases of the anterior segment. C. Jarry and L. Loisillier contribute an experimental study on the effect of cortisone on limbal wounds in rabbits' eyes. J. Sedan calls attention to the frequency of corneal hypesthesia in vernal conjunctivitis and the return of normal sensitivity with the use of cortisone.

Hervouet and Lenoir read an excellent paper on aspergillosis of the cornea. M. Busacca (São Paulo) describes the posterior detachment of the vitreous, giving a new, noteworthy explanation of its mechanism with valuable micrograms. J. François, M. Rabaey, and G. Vandermeerssche (Ghent) studied the corneal and scleral stroma with the electronic microscope.

C. Dejean's lecture on atypical experimental tuberculosis was very informative. G. Offret, H. Saraux, and Mme. J. Brisson emphasize the importance of puncture of the anterior chamber and of bacteriologic examination of the aqueous in order to establish the etiology in cases of keratitis and iritis. L. Paufique outlines his treatment of Fuchs' corneal dystrophy. The corneal endothelium was peeled off with a curette and, after the eye became quiet a penetrating keratoplasty was performed.

P. Desvignes interprets the findings in pseudopapilledema. J. Legrand presents a comprehensive statistical study on the end results of operations on chronic glaucoma. E. Hartmann, C. Topalis, and G. Lombard had excellent results with hyaluronidase both in ocular anesthesia and in increasing the penetration of various drugs into the eye. Mme. Schiff-Wertheimer, J. Fortier, and J. Maria describe a case of meningeal and uveoretinal reaction which followed the removal of a corneal foreign body and which was caused by the herpes virus.

J. Marwas and A. D. Hirschberg treated recurrent retinal hemorrhages in 12 young adults with subcutaneous implantations of testosterone. The recurrent intraocular hemorrhages were stopped by this treatment in nine of their patients. The follow-up periods ranged from eight to 12 months. H. A. Miller, M. Sapir, and M. Levy observed the correlations of the fundus picture, the retinal diastolic blood pressure and the serum globulin in cases of atheroma and hypertension.

I. S. Tassman (Philadelphia) discusses the problems of diabetic retinopathy and evaluates the modern concepts in its pathogenesis.

Alice R. Deutsch.

PERIMETRY. By Joshua Zuckermann, M.D. Philadelphia, J. B. Lippincott Company, 1954. 391 pages, 156 illustrations, index. Price: $10.00.

No one questions the importance of perimetry from either a diagnostic or prognostic viewpoint. Like virtue, all ophthalmologists are for it. However, the fact remains that it can be tedious, aggravating, and time consuming. For these reasons, it is too often delegated to the nurse or receptionist in one's private office, or to the resident and even the intern in the hospital and clinic. Nowadays this need not be so, for the equipment is greatly improved and standardized and there are available books of instruction that are helpful and stimulating. This combination should revive and stimulate interest in the busy clinician who is conscientious and anxious to do everything that is right and necessary for his patient's welfare.

American ophthalmologists have been handicapped to a certain extent by a lack of an appropriate manual or textbook of perimetry. To be sure, we have had the classic book by H. M. Traquair (sixth edition, 1949) published in Great Britain, and this has given us pleasure and profit for many years. The textbook by the late Luther C. Peter of Philadelphia has long been out of print and out of date. The German-reading ophthalmologists have enjoyed Hans Lauter's *Das Gesichtsfeld* (Springer, 1944) and the French ophthalmologists, the magnificent and comprehensive volume *Le Champ Visuel* by A. Dubois-Poulsen (Masson, 1952).

It is timely, therefore, that Dr. Zuckermann has favored us with a most satisfactory and useful book on *Perimetry*. He is a teacher of perimetry in the New York Eye and Ear Infirmary, Columbia University, and the New York University Post-Graduate School, and thus is eminently qualified. He is co-author with Conrad Berens of the useful book, *Diagnostic Examination of the Eye*, that many of THE JOURNAL readers have enjoyed.

Dr. Zuckermann introduced the subject with the proper assumption that the reader is a beginner in this field and needs to learn the vocabulary, equipment, and technique. He then proceeds in a logical manner to develop the subject with most helpful data, some of it original. He rightly assumes that the subject is of importance not only to the ophthalmologist but to the internist and neurologist. One of the most useful chapters is called "Pitfalls in perimetry" and this bears careful study. The material is original and instructive.

The charts, diagrams, and illustrations are fine. There is an excellent bibliography and an adequate index. This work is highly recommended.

Derrick Vail.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

5

DIAGNOSIS AND THERAPY

Giardini, A., and Cambiaggi, A. **Comparison of intradermal and percutaneous tuberculin studies in ophthalmology.** Boll. d'ocul. **33**:297-304, May, 1954.

The authors compared Mantoux's allergometric intradermal reaction with D'Antona's allergometric percutaneous reaction. Ninety patients reacted to the Mantoux test as follows: 54 positive, 36 negative. Of those with positive Mantoux, 48 showed positive, and 6 had negative reresponses to the intradermal reaction with old tuberculin; among the Mantoux-negative patients, 25 were also negative for the intradermal reaction but 11 showed a positive reaction. In the tabulated data the results were broken down as to intensity of reaction and ocular diagnosis. The author concluded that D'Antona's reaction was not inferior to Mantoux's classical method and that it has the advantage of greater simplicity of performance. (3 tables, 16 references) K. W. Ascher.

Moore, M. C. **The use of beta radiation in ocular disease.** Tr. Ophth. Soc. Australia **13**:59-71, 1953.

Treatment of superficial non-malignant ocular lesions by beta ray therapy is described and the applicators containing radon and strontium 90 are illustrated and methods of their standardisation are given.

In 11 cases of vernal catarrh (palpebral and limbal) there was satisfactory symptomatic relief. Rosacea keratitis, corneal vascularisation and angiomata were also treated. Despite the fact that strontium 90 is a pure beta emitter (without any gamma rays) its beta particles seemed more energetic than those of radon.

Ronald Lowe.

Pujol Canicio, Alberto. **The local application of antihistaminics in ophthalmology.** Arch. Soc. oftal. hispano-am. **14**: 436-465, April, 1954.

This exhaustive review of the literature is divided into four parts: 1. a review of the present concept of allergy; 2. the pharmacology of antihistaminics; 3. the ocular diseases suitable for antihistaminic therapy; and 4. the method of their application in ophthalmology. These drugs are indicated for the control of the local manifestations of allergic processes. Local application usually suffices, but it is often combined

with internal administration when there are allergic manifestations in other parts of the body also. (32 references)

Ray K. Daily.

Salgado Gomez, E. **Subconjunctival air injection in ocular surgery.** Arch. Soc. oftal. hispano-am. **14**:242-243, Feb., 1954.

The author uses subconjunctival air injections in all cases requiring dissection of the conjunctiva. Air is injected where the separation of the conjunctiva is to be made, after which the dissection of the conjunctiva becomes very easy. The air adds to the anesthesia, diminishes hemorrhage, and eliminates conjunctival perforation. The author uses the procedure in scleral resection, retinal detachment, strabismus, fistulating operations and pterygium. He is particularly enthusiastic about it in enucleation; the dissection of the conjunctiva is rapid, free of blood, and a dry field is provided for the electric knife if the surgeon wishes to use it. (4 figures)

Ray K. Daily.

Schirmer, R., and Germans, W. **The effect of sodium proprionate on external diseases.** Klin. Monatsbl. f. Augenh. **125**: 358-361, 1954.

In 66 patients with acute conjunctivitis the results were satisfactory, but not as prompt as with an antibiotic. Chronic conjunctivitis responded very well. Viral infections, blepharitis, phlyctenular conjunctivitis and corneal ulcers could not be influenced. Allergic reactions to the drug were not seen. (3 tables, 8 references)

Frederick C. Blodi.

Selfa, Enrique. **The use of hyaluronidase and fibrinolytic enzymes in ophthalmology.** Arch. Soc. oftal. hispano-am. **14**:425-435, April, 1954.

Hyaluronidase is effective only by injection, is indicated as an addition to anesthetic solutions, and as a medicament to promote the absorption of recent corneal opacities, lens remains, and vitreous hemorrhage. The author used it with excellent results in 23 adults with corneal opacities which followed traumatic and infectious keratitis. He reports a spectacular case of a severe bilateral corneal burn following an explosion. The patient had severe bilateral conjunctival injection, bilateral symblepheron, total ulceration of the left cornea, and an ulcer occupying three-fourths of the right cornea. The left cornea had been destroyed. The ulcer of the right eye healed in three months, after which hyaluronidase was injected for the absorption of the cicatricial tissue. Four months later the right eye had a visual acuity of $^{8}/_{10}$. Hyaluronidase injected in a case of extracapsular extraction to hasten the absorption of retained lens cortex, lead to prompt absorption of the lens masses, but there was a recurrence of the pericorneal injection and some pain. Its effect was doubtful in three cases of vitreous hemorrhage in diabetics. It can be used as a hypotensive in uveitis with secondary glaucoma, but in such cases it is not superior to retrobulbar alcohol injection. The author believes that the fibrinolytic enzymes will replace cauterization of the cornea in cases of serpigenous ulcer and corneal abscesses. (1 figure)

Ray K. Daily.

6

OCULAR MOTILITY

Carreras, Marcello. **Monocular diplopia following spontaneous recovery of strabismus.** Arch. Soc. oftal. hispano-am. **14**:510-520, May, 1954.

Carreras reports a case of diplopia in the amblyopic eye of a patient, 20 years old, who made a spontaneous recovery from strabismus which began in childhood. The patient noted this diplopia in near vision; in distant vision it was scarcely perceptible. The origin of mo-

nocular diplopia is discussed, and in this case it was ascribed to the persistence of false projection after the recovery of true projection. The following symptoms are characteristic of monocular diplopia after strabismus: 1. a history of strabismus with sensory anomalies, 2. the diplopia occurs in the eye which deviated previously, 3. a latent period between the disappearance of the strabismus and the appearance of the diplopia, 4. the diplopia is related to binocular vision and macular fixation of the good eye, 5. the diplopia is more marked in near vision than in distant, 6. a certain degree of macular suppression is associated with binocular vision and fixation with the normal macula, 7. the presence of amblyopia exanopsia, and 8. the patient is aware of the diplopia in the amblyopic eye inspite of its appearance only during binocular vision. (2 figures, 6 references) Ray K. Daily.

Castanera, A., and Muinos, A. **Treatment of false macula by luminogenic scotoma.** Arch. Soc. oftal. hispano-am. **14**: 529-535, May, 1954.

The authors describe a modification of Bangerter's method of correction of false macula in cases of strabismus, by means of creating a scotoma in the false macula by strong illumination and during the duration of the scotoma stimulating the true macula with rhythmic flashes of light from the slitlamp controlled by a metronome. Bangerter occludes the good eye, and depends on fixation with the false macula of the deviating eye. The authors' modification was developed as a result of the difficulties they encountered in obtaining accurate fixation with the false macula, in cases in which the false macula was not absolute and the occasional function of the true macula led to its involvement in the scotoma. The modification consists in using a major amblyoscope. A picture is fixed with the good eye, the strong illumination is directed on the false macula of the deviating eye, and after the scotoma is established the light is reduced and the true macula stimulated for 10 to 20 minutes. Six to 12 treatments were given daily or every other day. Of 21 patients thus treated, 12 in whom the eccentric fixation was not absolute recovered normal fixation within a short time. Of the other nine, in whom the false macula was absolute, only four recovered fixation with the normal macula, and that after several months of treatment associated with complete occlusion of the good eye. (2 figures) Ray K. Daily.

Lance, P. M. **Intermittent divergent strabismus from an orthoptist's point of view.** Tr. Ophth. Soc. Australia **13**:172-181, 1953.

Divergent squint was seen 308 times among 1,176 orthoptic patients. The incidence in Australia may be high because many of the patients begin by shutting one eye in bright light. Cases with constant divergence are unsuitable for training. Intermittent divergent squints may be divided loosely into the following groups 1. divergence excess; 2. convergence insufficiency; 3. combined. Occlusion is essential to cause full relaxation and recognition of diplopia. Fusion is then developed but convergence exercises should not begin until central suppression is overcome. Home exercises are important. Most people can be made comfortable without operation, which is required only for refractory cases.

Ronald Lowe.

Sebas, S. Raphael. **Clinical orthoptics.** Rev. brasil. oftal. **13**:73-80, June, 1954.

A brief review of the history of orthoptics is given. Orthoptics has progressed rapidly in Brazil since 1947 when the English technician, Miss Berle Mayou, visited Brazil and gave impetus to the establishment of orthoptic centers in various Brazilian medical centers. Orthoptics should

precede surgery in many cases and surgery should be deferred in many instances until maximum benefit has been obtained from the orthoptic clinic. The time required varies from case to case, perhaps from two months to three years, and is actually a true learning period, comparable to the one necessary to learn well the fundamentals of a foreign language. (8 references) Theodore Bisland.

7

CONJUNCTIVA, CORNEA, SCLERA

Bignell, J. **The problems associated with scleral resection for high myopia.** Tr. Ophth. Soc. Australia 13:104-109, 1953.

Lamellar resection allows much larger strips of sclera to be removed with less risk than full thickness resection. Repeated paracentesis of the anterior chamber reduces the volume of the eye without loss of vitreous, because fluid passes out of the vitreous into the aqueous as the iris and lens go backwards.

Ronald Lowe.

Böke, Wilhelm. **Histologic examinations of epidemic keratoconjunctivitis.** Klin. Monatsbl. f. Augenh. **125**:31-39, 1954.

A 65-year-old man died five weeks after he experienced the acute stage of an epidemic keratoconjunctivitis. One globe and part of the conjunctiva could be examined histologically. There were subepithelial cellular infiltrates in the cornea. Bowman's membrane was severely damaged. The changes in the conjunctiva were rather uncharacteristic and consisted mainly of a round cell infiltration. Inclusion bodies were not found. (5 figures, 13 references) Frederick C. Blodi.

Casanovas, J., and Monguio, J. **Scleral pigmentation in alcaptonuria.** Arch. Soc. oftal. hispano-am. **14**:379-391, April, 1954.

The patient, a man, 70 years old, had an alcohol-tobacco amblyopia, and a vitamin B deficiency. He had bluish scleral foci in the interpalpebral region and a transitory alcaptonuria. Therapy by proper diet, containing fats, and heavy doses of vitamin B and C led to rapid improvement of vision, which was markedly reduced by central scotomas, had but little effect on the pigmented foci. The differential diagnosis of pigmented scleral foci is discussed. (7 figures, 33 references)

Ray K. Daily.

Cascio, G. **The pathogenesis of keratoconus: the effects of the principal provocative tests on the ocular tension.** Arch. di ottal. **58**:223, May-June, 1954.

The author investigated the claim that keratoconus can be regarded as an equivalent of glaucomatous cupping of the optic nerve by applying a series of provocative tests to nine patients with keratoconus. The results were all entirely negative and it is concluded there exists no connection between glaucoma and keratoconus.

John J. Stern.

Friemann, Werner. **Treatment of deep corneal foreign bodies.** Klin. Monatsbl. f. Augenh. **124**:672-675, 1954.

The foreign body is extracted with a 2-mm. penetrating corneal trephine. The excised corneal cylinder is replaced. No sutures are necessary. Two cases were successfully treated by this method. (2 figures) Frederic C. Blodi.

Günther, Georg. **Bilateral repeated keratoplasty with cataract extraction in rosacea keratitis.** Klin. Monatsbl. f. Augenh. **124**:675-680, 1954.

This 56-year-old patient had a severe bilateral rosacea keratitis. After seven penetrating keratoplasties the corneaes finally remained clear. One eye required five antiglaucomatous operations in addition. (1 table) Frederick C. Blodi.

Kettesy, A. **Protection of the cornea in lagophthalmus and especially in malignant exophthalmus.** Klin. Monatsbl. f. Augenh. **125**:71-82, 1954.

The cornea can be protected by the local application of oil and vaseline, by the use of a moist chamber or by a narrowing of the palpebral fissure. The last can be achieved by a Frost suture or a tarsorrhaphy. The author uses Elschnig's method but puts the sutures vertical to the lid margin. A kanthoplasty can be done to loosen the lids (a Frost suture will usually follow). The levator can be tenotomized; but only in thyrotoxic exophthalmus is this operation indicated. Burian's suture, conjunctival flap over the cornea, or orbital decompression can be tried. (11 figures, 19 references)

Frederick C. Blodi.

Müller, H., and Piesbergen, H. J. **Periangiitis in the form of a circumscribed scleritis.** Klin. Monatsbl. f. Augenh. **125**: 13-21, 1954.

A 49-year-old woman had repeated attacks of phlyctenular keratoconjunctivitis. The right eye became blind and then developed an acute scleritis. The enucleated eye revealed a severe angiitis and periangiitis. The second eye developed multiple nodular sw 'lings in the retinal arterioles 10 months after the operation. Such a fundus picture was also found in a 30-year-old man. These changes are regarded as morphologically typical, but etiologically unspecific, hyperergic vascular reactions. (4 figures, 54 references)

Frederick C. Blodi.

Philps, Seymour. **New methods of examining the cornea: keratography.** Tr. Ophth. Soc. Australia **13**:72-85, 1953.

Fincham's apparatus for photographing irregularity in the corneal surface, and the apparatus of Maurice and Giardini for measuring corneal thickness are described.

Ronald Lowe.

Rohrschneider, W., and Stöhr, C. **Acute keratoconus.** Klin. Monatsbl. f. Augenh. **125**:305-315, 1954.

Acute keratoconus is a sudden deterioration in the course of a classical keratoconus. It leads to a sudden impairment of vision and is probably caused by a rupture in Descemet's membrane. It is comparatively rare and occurs in only about 11 percent of all cases of keratoconus. Five such patients were observed within one year at the clinic in Munich. The acute exacerbation occurs usually at the end of the development of a keratoconus. It may lead to scarring and flattening of the conical cornea and therefore, finally to improvement of vision. (8 figures, 1 table, 28 references)

Frederick C. Blodi.

Walser, E. **The treatment of keratoconus.** Klin. Monatsbl. f. Augenh. **125**:315-329, 1954.

Eight patients were treated by means of keratoplasty. Six grafts remained clear. This operation is indicated when conservative procedures have been exhausted and when the vision is less than $\frac{1}{15}$. The transplant should have a diameter of 6 mm. The fixation of the transplant is done with three direct sutures and a contact glass. (21 figures, 61 references)

Frederick C. Blodi.

Weve, H. **Reefing of the sclerotic.** Tr. Ophth. Soc. Australia **13**:101-103, 1953.

Reefing of the sclerotic is a temporary measure used in those cases of retinal detachment where parts of the retina have to be brought forcibly into contact with the outer wall of the eye, especially when a new defect has formed along the central borderline of the field of diathermy coagulation, or where isolated star-shaped folds have formed in the retina.

Ronald Lowe.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Colvin, C. **Traumatic hyphema and reactionary hemorrhage.** Tr. Ophth. Soc. Australia **13**:164-167, 1953.

Four cases are reported. The author considers that the aqueous dissolves the clot from a torn vessel and reactionary hemorrhage results. Complete rest, sedatives and double bandages are advocated. Paracentesis and irrigation were not very successful. Ronald Lowe.

De Ferrari, G. **Essential atrophy of the iris with glaucoma; satisfactory results of surgical treatment.** Boll. d'ocul. **33**:290-296, May, 1954.

A 40-year-old woman with the above mentioned syndrome was followed for four years after normalization of her eye pressure by means of a sclerectoiridectomy. Visual acuity and eye pressure remained under control; the iris atrophy, however, showed further progression. (1 figure, 38 references) K. W. Ascher.

De Souza, Admardo Rocha. **Sympathetic ophthalmia.** Rev. brasil. oftal. **13**: 181-196, Sept., 1954.

The various theories on the development of sympathetic ophthalmia are reviewed. The interval between the injury and the development of sympathetic ophthalmia is observed to be from nine days (Joy) to 30 or 40 years or more. The clinical characteristics, the histopathologic findings and the prognosis are reviewed. The author believes that once a diagnosis of sympathetic ophthalmia has been made, then immediate treatment with the antibiotics, "stock vaccines," autohemotherapy, mercurials, arsenicals, and sodium salicylate is indicated. The action, use, and limitations of ACTH and cortisone are discussed. The author reports three cases of sympathetic ophthalmia in which there had been penetrating injuries of the blind eyes three months, five years and twelve years before the examination. In each case, enucleation of the blind eye was carried out and a definite improvement in the vision of the sympathetized eye was noted. (10 references)

Theodore Bisland.

Hansen, Karl. **Luetic-allergic iritis.** Klin. Monatsbl. f. Augenh. **124**:736-738, 1954.

The author believes that the case reported by Palich-Szanto (Klin. Monatsbl. f. Augenh. 123:734-1953) was an allergic iritis precipitated by a specific sensitization to egg albumin and not a luetic allergy provoked by an unspecific allergy.

Frederick C. Blodi.

Lopez Marin, Ignacio. **Vogt-Koyanagi syndrome.** Arch. Soc. oftal. hispano-am. **14**:224-241, Feb., 1954.

The literature is reviewed and two cases reported. The difficulty of a differential diagnosis between the Vogt-Koyanagi syndrome and Harada's disease is pointed out.

The first patient, a man 32 years old, presented himself complaining of a bilateral visual disturbance before any objective signs were demonstrable. Two days later there was a hyperemia and blurring of the outline of each optic disc, then the symptoms of the disease developed rapidly, in spite of all therapeutic efforts. The inflammatory process subsided in three months; at this time several areas of alopecia areata appeared, and the beard and lashes turned gray. Fourteen months from the onset of the disease secondary glaucoma in the right eye required an iridectomy, after which the intraocular hypertension subsided. Finally 17 months after the onset of the disease the right eye had imperfect light perception, and the left eye had a visual acuity of 2/30. The second patient, a man, 46

years old, complained of a painless visual disturbance in both eyes of four days' duration. A week later the patient had headaches, tinnitus, and deafness and both eyes exhibited the fundus picture of the disease, with a possible retinal detachment and bilateral uveitis. The final outcome at the end of two years was pupillary occlusion and seclusion, light perception with poor projection in the left eye, and total blindness in the right eye. This patient developed alopecia, poliosis, and graying of the hair, lashes, and eyebrows. A third case is reported as a curiosity. A woman, 26 years old, was given a weak solution of zinc sulfate for a diplobacillus conjunctivitis. She returned 10 days later with gray eyelashes which she ascribed to the zinc solution. A thorough general and ocular examination failed to reveal the etiology of this change. Without any treatment her eyelashes resumed their normal dark color at the end of two years. (5 figures, 40 references) Ray K. Daily.

Mazuelos Vela, Manuel. **Recurrent post-aureomycin iridocyclitis.** Arch. Soc. oftal. hispano-am. **13**:1497-1500, Dec., 1953.

The author reports three cases of severe iridocyclitis following treatment of relapsing fever with large doses of aureomycin. He notes that previous to the introduction of aureomycin in the treatment of relapsing fever, such severe cases of iridocyclitis were not encountered. He attributes the intense irritation of the uvea to the products of massive destruction of the spirochetes, acting as the Herxheimer reaction in syphilis. Because of the gravity of these cases, characterized by long duration of the process and slow and incomplete recovery of vision, the author advocates that patients with a history of several attacks of relapsing fever should be treated at first with small doses of aureomycin, which will produce a less rapid and less complete destruction of the parasites. If no iritis develops, large doses of the drug may be administered subsequently. (6 references) Ray K. Daily

Mueller, Horst. **The phacogenetic reaction, its clinical signs and histology.** Arch. f. Ophth. **155**:187-212, 1954.

Twenty-nine eyes were studied clinically and histologically. The patients usually had had uveitis, thrombosis of the major retinal veins or injuries. Often the condition had persisted for many years. Damage or degeneration of the lens capsule had been found in eight cases. In an equal number of patients the lens capsule had been opened during a surgical procedure. Often the eyes had been removed because of suspicion of sympathetic ophthalmia. These studies led the author to the following conclusion. Inflammatory reactions might occur when lens material enters the eyeball. Usually it remains difficult to discriminate between a simple infection, sympathetic ophthalmia and a phacogenetic reaction. Where uveitis and cataract simultaneously occur, a phacogenetic reaction must be considered. Shrinking of the lens might indicate the passage of lens material into the eyeball. Occlusion of the pupil suggests a major involvement of the posterior segment. Histologically different types of uveitis are seen, showing more or less cellular and vascular reactions. A secondary increase in tension usually seems to be produced by a block of the angle of the anterior chamber. Animal experiments and other clinical and histological studies suggest that the concept of a phacogenetic reaction is sufficiently supported and deserves the diagnostic consideration of the practitioner. (7 figures, 1 table, 22 references) Ernst Schmerl.

9

GLAUCOMA AND OCULAR TENSION

Ascher, K. W. **The aqueous veins in glaucoma.** Boll. d'ocul. **33**:129-144, March, 1954.

Closely related problems of general physiologic interest and of more restricted clinical significance are dealt with. The detection of the aqueous veins by K. W. Ascher, in 1941, proved the presence of a continuous elimination of aqueous humor, and, therefore, also of a continuous production. The responses of aqueous veins to different mechanical, physiologic and pharmacologic factors were studied by the author and by other investigators; the constancy and significance of these structures were confirmed. Other ophthalmologic problems—comparative physiology, pharmacology, and tolerability of refraction-correcting contact lenses—were also approached by a study of the aqueous veins.

Soon it became obvious to the author that problems of the pathogenesis of glaucoma should be attacked from a new angle. Aqueous veins occur in glaucomatous eyes as well as in normal ones, but less frequently in certain types of glaucoma. Their reactions to some tests differ from the responses in eyes with normal intraocular pressure. From the knowledge of the aqueous veins accumulated during the past years the author arrived at the hypothesis that a narrowing of the outlets of Schlemm's canal may initiate the elevation of intraocular pressure in at least some cases of glaucoma. A study of the aqueous veins of glaucomatous eyes seems to support the retention theory of glaucoma, which is given further credence by recent investigations of the resistance to outflow under tonometer pressure. (6 figures, 55 references)

K. W. Ascher.

Bayo y Bayo, J., and de la Pena, A. **The action of paranitrophenylphosphate (mintacol in glaucoma.** Arch. soc. oftal. hispano-am. **14**:415-424, April, 1954.

Propicol is the Spanish preparation similar pharmacologically to mintacol (Bayer). The authors report on the action of Propicol in glaucoma, illustrated by a report of its application in eight clinical cases. The authors consider it more effective than 4-percent pilocarpine. The first instillation may be followed by a rise in intraocular pressure, caused by a sudden increase of aqueous humor, but this is soon followed by a fall. No case of intolerance to the drug has been encountered. The authors claim that Propicol is superior as a hypotensor to the commonly used drugs, and is useful preparatory to glaucoma surgery. (8 figures, 4 references)

Ray K. Daily.

Beckett, H. C. **Early diagnosis of chronic simple glaucoma.** Tr. Ophth. Soc. Australia **13**:110-127, 1953.

A quick Bjerrum screen test should be performed as a routine in all ocular examinations of patients over 40 years of age. Small scotomas or other defects will be found in patients with no symptoms suggestive of glaucoma. A phase tension test will confirm that some of these defects are due to otherwise unsuspected glaucoma. Pilocarpine will control the disease in the early stages before organic changes occur. The most useful symptom to arouse suspicion of early glaucoma simplex is pain or neuralgia affecting the ophthalmic nerve. 19 case histories are presented.

Ronald Lowe.

Comberg, W. **Glaucoma without hypertension: "paraglaucoma."** Klin. Monatsbl. f. Augenh. **125**:257-262, 1954.

A 65-year-old man had a bilateral glaucomatous excavation of the disc although the intraocular pressure never exceeded 30 mm. Hg. All provocative tests remained negative. The author believes that this is a case of pseudoglaucoma. A disturbance of the vascular function is probably of the greatest importance in the development of the excavation. (2 figures)

Frederick C. Blodi.

Cristini, G. **The oxygen uptake of the uvea in the glaucomatous eye.** Ann. d'ocul. **187**:401-408, May, 1954.

By measuring oxygen concentrations of the venous and arterial blood from a limb, and the venous blood from the venae vorticosae in 10 patients with primary glaucoma the author found the oxygen uptake in the uvea to be greater than that in the limb. In two controls (nonglaucomatous eyes about to be enucleated for malignant melanoma of the choroid) the oxygen uptake in the uvea was the same as in the limb. He suggests that in the glaucomatous eye, there may be a slowing of the circulation, facilitating the liberation and diffusion of oxygen from the vessels into the tissues. (14 references)

John C. Locke.

Foroni, M. **Triangular-valve (or inverted-T) sclerotomy in glaucoma.** Ann. d'ocul. **187**:369-371, April, 1954.

The author describes his personal technique of iridosclerotomy, which he feels is especially effective not only in regulating ocular tension, but in avoiding the causes of the late infection which always is possible after fistulizing operations. A large conjunctival flap is dissected down to the limbus from above. A horizontal ab-externo incision, 7.5 mm. in length, is made in the exposed corneal periphery. A vertical scissors incision is then made in the sclera beginning at the center of the horizontal incision and extending upwards for 3 mm., forming an inverted T. Peripheral iridectomy and conjunctival closure complete the procedure.

The double incision, horizontal and vertical, produces two small triangular scleral flaps, which under the pressure of the aqueous, act as valves. Their reunion is prevented because the circular disposal of the scleral fibers in this region, acting in the manner of sphincters, results in a perceptible divergence of the flap edges. (1 figure, 11 references) John C. Locke.

Funder, Wolfgang. **The somatotype in primary glaucoma.** Klin. Monatsbl. f. Augenh. **125**:262-265, 1954.

A series of 100 patients with acute glaucoma and one of 200 patients with chronic simple glaucoma were examined. In both series more than 50 percent of the patients were of the pyknic type. Among 475 normal patients there were only 27.4 percent pyknic persons. The pyknic type seems to have a stronger disposition to develop glaucoma than other somatic types. (2 tables, 12 references)

Frederick C. Blodi.

Kleinert, Heinz. **The influence of diamox on the increased intraocular pressure. Klin. Monatsbl. f. Augenh. 125**:271-279, 1954.

Thirty patients with various forms of glaucoma were treated with diamox (500 to 250 mg. daily). In all but two of them the intraocular pressure could be reduced. The author does not believe that this drug decreases the production of aqueous, but that it decreases a postulated edema at the chamber angle and so facilitates the outflow. However, no proof is offered, and no tonographic measurements were done. (6 figures, 1 table, 4 references)

Frederick C. Blodi.

Kreibig, W. **The surgical treatment of acute glaucoma.** Klin. Monatsbl. f. Augenh. **125**:39-44, 1954.

The author uses a 1.8 mm. trephine to perform the total iridectomy in an acute attack. The edges of the wound are smoother and sharper and there is less danger of iris incarceration. If the intraocular pressure remains high despite medication, a posterior sclerotomy should precede the combined trephine-iridectomy. Thirty patients were operated on in that way and only two showed some complications (retinal or vitreous hemorrhage). Frederick C. Blodi.

Leydhecker, W. **A provocative test for glaucoma with priscoline.** Klin. Monatsbl. f. Augenh. **125**:57-61, 1954.

This vasodilator is injected subconjunctivally in the suspected eye. The normal eye may show a rise of up to 14 mm. Hg and reach nearly 40 mm. Hg. Twenty-nine out of forty-five eyes with chronic glaucoma gave a pathologic reaction to this provocative test. The first tonometric reading must be done 15 minutes after the injection. This test seems to be more reliable than the water-drinking test and causes less general symptoms than the test with vasculat originally advised by the author. (Klin. Monatsbl. f. Augenh. 123:568, 1953) (3 tables, 3 references).

Frederick C. Blodi.

Lowe, R. F. **Glaucomato-cyclitic crises.** Tr. Ophth. Soc. Australia **13**:168-171, 1953.

The syndrome is described. A case is presented with some features different from those described by other authors—namely, the occurrence of severe pain, very high tension, intense ciliary injection and the formation of a dense posterior synechia. Attacks had recurred in one eye over a period of 25 years but the vision had remained normal after each attack had subsided. Ronald Lowe.

Mankin, W. R. **A survey of patients seen at the glaucoma clinic of the Medical Eye Service of New South Wales.** Tr. Ophth. Soc. Australia **13**:128-132, 1953.

This is a preliminary report of work at the clinic. Ronald Lowe.

Pau, Hans. **A rise in blood pressure as a provocative test for glaucoma.** Klin. Monatsbl. f. Augenh. **125**:45-56, 1954.

Nor-ephedrin was injected intravenously and blood pressure and intraocular pressure were checked repeatedly. In normal eyes the relative increase of the intraocular pressure is much smaller than that of the blood pressure. However, in labile patients and especially in chronic glaucoma, the relative pressure increase in the eye is much higher than the increased blood pressure. Antiglaucomatous operations and miotics may normalize this provocative test. (8 charts, 35 references)

Frederick C. Blodi.

Paufique, L., and Etienne, R. **Clinical survey of therapeutic indications in infantile glaucoma.** Ann. d'ocul. **187**:305-317, April, 1954.

The authors performed goniotomy in 17 cases of infantile glaucoma and consider this the operation of choice in the early stages. For the later stages they recommend nonperforating cyclodiathermy combined with cyclodialysis. The cyclodiathermy is confined to the two upper quadrants and the cyclodialysis is done below. (1 figure, 18 references)

John C. Locke.

Schumacher, Heinz. **The fall of the intraocular pressure after salicylic acid.** Klin. Monatsbl. f. Augenh. **125**:299-305, 1954.

The eyes are extremely soft in salicylate poisoning and the intravenous injection of salicylates is sometimes of benefit in acute glaucoma. The effect is certainly not an osmotic one. Salicylic acid has no effect when applied locally, though it penetrates the cornea well and accumulates in the anterior chamber. The effect is a systemic one and works probably via the hypothalamic centers. (1 figure, 50 references) Frederick C. Blodi.

Sebas, S. Raphael. **Progesterone in glaucoma.** Rev. brasil. oftal. **13**:83-85, June, 1954.

The work of A. Obel of Berlin, presented in 1950 in Britain, is reviewed. Progesterone was given to men, women and children with acute and chronic glaucoma. Acute glaucoma was spectacularly

alleviated in four cases and 30 patients that had chronic hypertension were favorably influenced. It is concluded that the male sex hormones increase the ocular tension while the female sex hormones (especially those of the corpus luteum—progesterone) lower the tension.

Theodore Bisland.

Sédan, Jean. **Results of 262 antiglaucomatous fistulizations evaluated four to 32 years after the operation.** Ann. d'ocul. **187**:409-419, May, 1954.

The author believes that the unique value of this report on the results of surgical treatment of 262 cases of chronic simple glaucoma lies in the length of the followup period. Only cases observed for from four to 32 years postoperatively are included. Lagrange sclerectomy was performed in 108 of the cases, Elliot trephine in 153, and in one there was a self-fistulization. Stabilization of the visual acuity occurred in 172 cases; in 42 cases there was an improvement, and in 48 cases a decrease. Normal ocular tension was obtained in 213 cases. Contrary to general belief, improvement in the peripheral visual fields was noted 29 times. In only 2 cases, however, did a scotoma become smaller; and in 14 cases, enlargement of the scotoma occurred in spite of perfect surgical normalisation of the tension. While the author does not intend to dispose of the medical treatment of glaucoma, he feels that this report emphasizes the efficiency of correctly performed surgery.

John C. Locke.

Thiel, R., and Schwarz, W. **Electronmicroscopic examination of components of the aqueous.** Klin. Monatsbl. f. Augenh. **125**:265-271, 1954.

The aqueous was obtained by puncture in local anesthesia. For a control picture the aqueous from a steer's eye was examined. The aqueous was diluted with an equal volume of formaline and dried. Normal aqueous shows fine, regular granules when viewed with the electron-microscope. In the aqueous of a patient with secondary glaucoma there were many filaments and fibrils. The aqueous of a patient with primary glaucoma contained large clumps, similar to the findings of the author in the vitreous of glaucomatous eyes. It is quite possible that these metabolites of the vitreous pass through the anterior hyaloid membrane into the aqueous. (4 figures, 3 references)

Frederick C. Blodi.

Weekers, L. **Nonperforating retrociliary diathermy in the treatment of ocular hypertension.** Ann. d'ocul. **187**:318-332, April, 1954.

There is no reason to set retrociliary diathermy and filtering operations in opposition to each other, since each type of procedure has its own specific indications and their modes of action complement each other. Iridencleisis is to be preferred as the initial procedure in primary glaucoma. Retrociliary diathermy is the operation of choice in absolute glaucoma, in aphakic glaucoma and in glaucoma secondary to uveitis. It has its greatest value as a secondary procedure where a filtering operation has failed to produce a sufficient hypotensive effect.

When properly performed, retrociliary diathermy is harmless, and some patients will accept this operation when they refuse other types. The hypotensive effects are less in degree and duration than in filtering operations. It would be possible to intensify these effects, but only by running certain risks, which the author wishes to avoid. The diathermy applications should be placed 7 mm. behind the limbus, around the entire circumference of the anterior segment, and should be nonperforating. A ¾ mm. pointed electrode is used, and it is not necessary to dissect up the conjunctiva.

John C. Locke.

10

CRYSTALLINE LENS

Custodis, E. **Hyphema and wound rupture after cataract extraction.** Klin. Monatsbl. f. Augenh. **124**:660-671, 1954.

The intraocular pressure was measured daily after the second post-operative day in a number of patients. During the first days the pressure was always low though there was no leaking from the wound. In many of the eyes the pressure rose slowly to reach normal values around the eighth day. These changes in pressure could account for the post-operative hemorrhages, though these occurred also in hypotonic eyes. The post-operative hypotonia is explained on the basis of a vasomotor reflex. (4 tables, 4 references)

Frederick C. Blodi.

Hamilton, J. B., and Waterworth, D. **Iris bombé as a complication of discission operations in congenital cataract.** Tr. Ophth. Soc. Australia **13**:133-143, 1953.

Four cases of iris bombé and secondary glaucoma following discission for congenital cataract are reported. The presence of small pupils that dilate poorly with mydriatics was a precursor. After repeated needlings, posterior synechiae further reduce pupil mobility. The majority of cases are caused by block of the pupil by vitreous. Aqueous collects behind the iris forcing the periphery against the cornea. Treatment should not be by iridectomy but by iridotomy, or the passage of a fine hypodermic needle through the iris and into the posterior chamber to drain off the aqueous which is present under pressure. Prophylaxis consists of preliminary iridectomy or full iridectomy combined with curette evacuation. If posterior capsulotomy is required, the vitreous should be disturbed as little as possible and every effort made to prevent loss of aqueous.

Ronald Lowe.

Paiva, Clovis. **Our experience with the Ridley operation.** Rev. brasil. oftal. **13**:137-145, Sept., 1954.

The Ridley implant was used in two cases in July, 1952 and August, 1953. In the first, at the end of ten months, the patient showed pigment on the anterior lens (implant) surface, a fixed pupil and posterior synechiae. Vision uncorrected was 20/40 and with a correction of −1.00 plus 4.50 axis 1, vision was 20/20. In the second case, at the end of five months, the patient had a miotic pupil with posterior synechiae. Vision was 20/140 (5/35) and corrected to 20/20 with a minus 4.0 cylinder at axis 75. A detailed description of the operation is given. It is concluded that, at the moment, and although the final results exceeded expectations, the Ridley implant operation presents a series of inconveniences and uncertainties, especially in the postoperative period which is described as "a truly tumultuous period." The author states that he prefers to continue with the classic intracapsular extraction, awaiting further results on the Ridley procedure. (4 figures, 6 references)

Theodore Bisland.

Putzar, W. **Conservative treatment of cataracts.** Klin. Monatsbl. f. Augenh. **125**:105-106, 1954.

This is a response to a paper by Qurin (Klin. Monatsbl. f. Augenh. 123:491) in which he wrote doubtfully of the value of "Sanolent" an extract of infantile animal lenses. Putzar, who first propagated this drug, used it in several hundred patients and nearly 50 percent benefited from this treatment. The extract is taken orally.

Frederick C. Blodi.

11

RETINA AND VITREOUS

Arrugaeta Franco, A. D., and Mozota Sagardia, S. **A case of nephrogenic retini-**

tis. Arch. Soc. oftal. hispano-am. **14**:297-303, March, 1954.

To demonstrate that under proper therapy recovery of albuminuric retinitis is possible, the author reports a case in a man, 26 years old, with chronic nephritis. By recovery he means that progress of the disease can be arrested, and only the irreversible lesions remain. This patient had albuminuric retinitis, with edema and hemorrhages in the fundus. Following an attack of uremia, he lost the vision of both eyes. With treatment he recovered sufficiently to lead a normal life, and vision was restored to ⅓ in each eye.

Ray K. Daily.

Ashton, Norman. **Pathological basis of retrolental fibroplasia.** Brit. J. Ophth. **38**:385-396, July, 1954.

The histology of established retrolental fibroplasia has been rather well described and it is believed that the primary pathologic change is angioblastic in nature, but the histology of the very early phases has not been so fully described. This essay is based on the histological study of the eyes of four premature infants who were placed in an oxygen chamber from birth but died within a few weeks from bronchopnuemonia. Grossly the first changes were seen to arise near the equator and consisted of extensive and dense outgrowths of new vessels advancing toward the ora serrata; each vessel growing out of the retina terminated in arborizing tufts which were buried in yellow gelatinous material. The retina beneath was edematous and folded in early detachment. Sections showed a profuse outgrowth of large, dilated, new vessels which emerged from the inner layers of the retina, through the internal limiting membrane and extended into the vitreous. Their growth was preceded by a solid cellular mass of vasoformative tissue in which the new vessels were developing. This new vessel formation was confined to the anterior layers of the retina and did not invade it beyond the inner molecular area. There were diffuse masses of spindle cells in the anterior layers of the retina and numerous fibrinous strands extended from the retina into the vitreous. These retinal changes diminished in intensity toward the ora. It was satisfactorily shown that the ora is probably never primarily involved although the retinal detachment may progress beyond the ora to involve the pars ciliaris. The disease as it is now recognized must necessarily be brought about by oxygen exposure in the premature infant. (14 figures, 20 references) Morris Kaplan.

Chavarria Iriarte, Ricardo. **Unilateral retinitis pigmentosa.** Arch. Soc. oftal. hispano-am. **74**:304-310, March, 1954.

A 12-year-old girl had retinitis pigmentosa of the right eye, with vision reduced to ⅓, and the visual field restricted. The left eye was normal. The literature on retinitis pigmentosa is reviewed. (6 figures, 5 references) Ray K. Daily.

Cremer, M. **The treatment of retinal vascular diseases with extracts of the wild chestnut.** Klin. Monastbl. f. Augenh. **125**:94-99, 1954.

For five years these extracts were used on patients with venous disorders of the fundus. The drug is given orally. The results were encouraging. (15 references)

Frederick C. Blodi.

Dehe, K. H. **Clinical studies of the Marcus Gunn phenomenon.** Arch. f. Ophth. **155**:167-186, 1954.

300 patients with high blood pressure and 60 normal persons were ophthalmoscopically studied. In a number of cases the observation of narrowing of veins running parallel to the arteries seemed to confirm Sallmann's histologic studies. Sallmann had found pronounced proliferation of the adventitia where the blood vessels cross each other. He considered the

Marcus Gunn phenomenon more as a sign of a vascular sclerosis than as an indication of permanent increase in blood pressure. The pressure exercised by the arteries upon the veins seems to be of minor importance. However, the Marcus Gunn phenomenon is common in persons with high blood pressure and is often combined with retinal hemorrhages and exudates. (18 figures, 7 tables, 17 references)

Ernst Schmerl.

Frey, R. G. **The development of the surgical treatment for retinal detachment at the second University Eye Clinic in Vienna.** Klin. Monatsbl. f. Augenh. **125**:329-336, 1954.

From 1951 to 1953, 195 eyes were operated upon. In 126 eyes (64 percent) the detachment was cured. In aphakic eyes good results were obtained in 17 of 42 eyes. The combination of scleral resection and diathermy has become more popular during the last two years. (1 figure, 4 tables, 8 references)

Frederick C. Blodi.

Gasparri, F. **Constitutional thrombophilia and thrombosis of the retinal veins.** Boll. d'ocul. **33**:347-355, June, 1954.

Fifty patients, most of them older than 50 years, with retinal thrombosis (table) were studied as to personal and family history, general blood pressure, blood sugar, blood nitrogen and prothrombin levels. The latter was above normal in the majority of the patients and so was the arterial blood pressure. (2 tables, 22 references)

K. W. Ascher.

Giri, D. V. **The prophylaxis of retrolental fibroplasia.** Tr. Ophth. Soc. Australia **13**:152-163, 1953.

A review of the literature is given.

Ronald Lowe.

Heinsius, Ernst. **Vascular disturbances in the retina of diabetic patients.** Klin. Monatsbl. f. Augenh. **125**:1-5, 1954.

This is a summary of the author's impression after having examined more than 2,000 diabetic patients. There is first of all the true diabetic retinopathy with capillary aneurysms. Then there are arteriolar sclerotic changes with yellow-white areas of retinal degeneration. This second form is as frequent in diabetic patients as the true diabetic retinopathy. Finally there are changes in the veins with smaller and larger thrombi. The important factor in the development of the lesions is the duration of the diabetes and the most important treatment is the regulation of the diabetes. Local treatment (vasodilators, anticoagulants) is sometimes of value. (11 references)

Frederick C. Blodi.

Jancke, G. **Diathermy treatment of uveal melanomas.** Klin. Monatsbl. f. Augenh. **124**:681-685, 1954.

A small tumor above the macula in a 16-year-old girl was treated with diathermy. Nevertheless, the tumor continued to grow and the eye had to be enucleated. Another patient, a 20-year-old man, had a retinal detachment with a suspected tumor. Diathermy brought a permanent cure. This type of treatment may be unsatisfactory in young patients. It should be tried only if a tumor arises in the only eye. (5 references)

Frederick C. Blodi.

Malatesta, C. **Ocular manifestations of Niemann-Pick disease.** Boll. d'ocul. **33**:368-378, June, 1954.

An 11-year-old girl with a large liver and spleen, turrecephaly, positive Bence-Jones reaction, and severe cachexia showed, two months before her death, a cherry red spot in the fovea of each eye, surrounded by a large, barely elevated gray area, three disc diameters in diameter. The relationship between Niemann-Pick disease and Tay-Sachs syndrome is discussed. (1 figure, 30 references)

K. W. Ascher.

Mehlhose, F. **The problems of the rutin effect in diabetic retinopathy.** Klin. Monatsbl. f. Augenh. **125**:5-13, 1954.

Sixty-nine patients with diabetic retinopathy were treated with rutin. No impressive effect could be noted. This is in contrast to another German report in which the therapeutic and prophylactic use of rutin was advocated (Niedermeyer: Klin. Monatsbl. f. Augenh. 121, 1952). The prophylactic use of rutin is expensive and of no proven value. Its local application could be an acceptable solution. (12 references) Frederick C. Blodi.

Payrau, P., and Selve, G. **Contribution to the diagnosis and pathogenesis of tapetoretinal degenerations and hemeralopias by a study of the urinary melanophore-dilator principle.** Ann. d'ocul. **187**:333-339, April, 1954.

The authors report the results of treatment with intermedin, the melanophore pituitary hormone, in 21 cases of retinitis pigmentosa, two of essential hemeralopia, and two of albinism. They observed a favorable action on the visual fields and on night vision, but no effect on diurnal visual acuity. Ophthalmoscopically, there was no regression of the lesions, but neither was there any progression over a two to three year observation period. To maintain the functional results, it was necessary to give the hormone at least once a week and to continue it indefinitely.

Measurements of the urinary activity of melanophore-dilator principle in normal and affected patients, before and after intermedin administration, were performed according to the technique of Bolgert and Habib by injecting 2 cc. of urine into the lymph sac of a frog and observing the intensity and rapidity of onset of skin pigmentation. The urine from mild and intermediate forms of retinitis pigmentosa produced more intense and rapid pigmentation than that from normal subjects. Urine from patients with very advanced retinitis, on the other hand, produced no pigmentary effect. Urine from patients with retinal pigmentary disturbance secondary to inflammatory chorioretinitis gave the same results as that from normal subjects, which gives the test diagnostic value.

Patients given intermedin showed an increase in urinary melanophore-dilator activity, which persisted for a longer time when the hormone had been administered in the form of conjunctival instillation than when it had been given by subconjuctival, subcutaneous, or retrobulbar injection. The authors therefore recommend that the hormone be given by conjunctival instillation (once weekly, 5,000 units per cc.).

Their results suggest that in the mild and intermediate forms there is normal secretion but improper utilisation of the pituitary hormone, but that in the very advanced forms, on the other hand, there is absent or decreased secretion. Continued studies may provide an argument in favour of the role of the pituitary gland in the pathogenesis of tapetoretinal degenerations. (48 references)

John C. Locke.

Philps, Seymour. **The Lindner-Guist operation.** Tr. Ophth. Soc. Australia **13**:86-94, 1953.

The operation of scleral resection for retinal detachment is fully discussed. 126 operations were performed between 1948 and 1952 with cures in 43 cases. The only contraindication is total retinal detachment which shows no sign of replacement after adequate bed rest. Not more than 180 degrees of globe were resected at one operation. Ronald Lowe.

Porstmann, W., and Wiese, J. **Retinopathy as part of a diabetic angiopathy.** Klin. Monatsbl. f. Augenh. **125**:336-354, 1954.

720 diabetic patients are evaluated. Among them were 326 patients with fundus changes. There was a definite connection between the duration of the diabetes and the appearance of the retinopathy. Arteriosclerotic changes in the vessels occurred more frequently in diabetic patients than in the general population; 80 percent of the patients with retinopathy had signs of a Kimmelstiel-Wilson disease of the kidney. (10 figures, 5 tables, 34 references) Frederick C. Blodi.

Remler, O. **The treatment of retinal vascular disturbances with hydergin.** Klin. Monatsbl. f. Augenh. **124**:713-734, 1954.

Hydergin is a mixture of three hydrated ergot alkaloids. It lowers the blood pressure in some patients with hypertension and it may dilate pathologically constricted cerebral vessels. Vascular disorders (arterial or venous occlusion) in the retina of older patients could not be influenced with hydergin. In younger patients however, there was a slight but definite effect. There was no effect in patients with disciform macular degeneration, quinine or methyl alcohol poisoning, or retinitis pigmentosa. The influence on the pressure in the central retinal artery was inconsistent. (8 figures, 25 references) Frederick C. Blodi.

Rippstein, Otto. **The fate of patients with retinoblastoma.** Klin. Monatsbl. f. Augenh. **124**:685-697, 1954.

Now that more retinoblastoma survivors are to be expected, the problem of transmission of this tumor becomes more important. Among 13 patients with a unilateral tumor 10 survived. One survivor married and has three healthy children. Out of six patients with bilateral tumor, only three survived, all of whom are blind. Thirteen of the patients had 18 siblings, all of them were healthy. In three eyes the optic nerves were not severed beyond the tumor infiltration. The orbits were irradiated and two patients survived. One eye showed an early extraocular extension along a posterior ciliary vessel. This patient died though an exenteration followed the irradiation of the orbit. (12 references) Frederick C. Blodi.

Weve, H. **Diathermic treatment of different forms of retinal detachment and results.** Tr. Ophth. Soc. Australia **13**:95-100, 1953.

This short paper comprises an analysis of parts of Professor Weve's vast series of detachment operations. The ratio of men to women was consistently 3:2, and the right eye is more often affected than the left in the ratio of 11:10. Only 54.5 percent of patients were myopic, 8 percent were aphakic, 10 percent were traumatic, and 31 percent were so-called senile. Operation within the first week of occurrence of the detachment is most important. A plea is made that retinal detachment should not be an operation performed by all ophthalmic surgeons but patients should be sent to centers where there are experienced surgeons and adequate facilities. Ronald Lowe.

Weve, H. **The origin and relationship between anterior dialysis, retinal cysts, retinal folds and retrolental fibroplasia.** Tr. Ophth. Soc. Australia **13**:35-46, 1953.

Cysts and anterior dialysis are the expression of the same process of degeneration in the same area of the retina (mostly the tempero-inferior quadrant). The development of cysts may promote a tear. Some cases previously described as retinal folds probably belong to the group later known as retrolental fibroplasia. All these conditions may be grouped together as degenerative processes and secondary organisations caused by abnormal oxygenation in early infancy, especially in those parts of the retina that are latest to be vascularized. Ronald Lowe.

12

OPTIC NERVE AND CHIASM

Carreras, M., and Bermudez Belzares, H. **Coloboma of the optic disc associated with macular changes.** Arch. Soc. oftal. hispano-am. **14**:277-285, March, 1954.

The authors add another case to the less than 50 reported in the literature. Five of these were associated with macular changes. The authors' patient, a woman, 50 years old, gave a history of visual deterioration for over a year associated with trauma to the left eye. The visual acuity of this eye was 1/16, and the visual field had a large absolute central scotoma, which extended from the blind spot to the point of fixation, and involved chiefly the inferior nasal segment of the field. Funduscopy revealed a small atypical coloboma of the optic disc, a central diffuse posterior retinochoroiditis in the cicatricial stage, and an atrophy of the papillo-macular bundle. The only interesting feature in the family history was a large incidence of rheumatic polyarthritis, limited to the women. The patient became aware of the visual defect, which she must have had all her life, after the trauma which caused a corneal erosion. The pathogenesis of this congenital lesion is discussed, and the defect attributed to faulty closure of the fetal cleft at the level of the anterior end of the nerve. The author believes that the form and position of this coloboma give support to the theory that in the course of development the fetal cleft rotates temporally. The associated macular lesions are attributed to the involvement of the papillo-macular bundle in the optic nerve, with consequent disturbance in the physiology, nutrition, and resistance of the macula. The nerve fibers corresponding to the defect, including the centrifugal fibers, are affected. The tropism of the macular and paramacular areas is disturbed, and these areas are subject to inflammatory processes caused by various toxins. This theory is supported by the law of probabilities, the frequency with which these colobomata occur in the inferior and temporal portion of the papilla, the frequency of the associated retinal lesions, and the campimetric defects. (6 figures, 5 references) Ray K. Daily.

13

NEURO-OPHTHALMOLOGY

Aguilar Bartolome, Jose M. **Vasodilators in the therapy of ophthalmic migraine.** Arch. Soc. oftal. hispano-am. **14**:547-554, May, 1954.

The author advocates intravenous injection of a combination of 2 to 5 cgm. of nicotinic acid, 7 cgm. of calcium chloride, and 8 cgm. of magnesium thiosulphate in 10 cc. of physiologic salt solution. The injections are administered twice weekly and 10 to 20 are given. (10 references) Ray K. Daily.

Bocci, G. **Pregnancy complicated by ocular chiasmatic signs of a meningioma in the sella turcica.** Boll. d'ocul. **33**:158-171, March, 1954.

During her third pregnancy, an otherwise normal 38-year-old woman developed severe loss of central vision and extensive visual field defects, and finally characteristic bitemporal hemianopia and optic nerve atrophy. One and one-half years previously, both optic nerves were normal but there was a relative central scotoma in the right field and right central vision reduced to 5/15. In the seventh month of pregnancy a premature delivery was induced; vision and fields continued to fail. Fifteen months later a meningioma of the tuberculum sellae turcicae was removed surgically. (2 figures, 57 references) W. K. Ascher.

Bonnet, Ilinca. **Arterial intracranial aneurysms and their ophthalmological manifestations. Anatomic-clinical forms.** Ann. d'ocul. **187**:420-450, May, 1954.

This is a general discussion of intracranial arterial aneurysms and their ophthalmological manifestations, studied from the point of view of anatomic-clinical forms. (16 figures) John C. Locke.

Carreras, Marcelo. **Optic atrophy of the infant following a prepartum hemorrhage.** Arch. Soc. oftal. hispano-am. **14**:405-414, April, 1954.

A 4-year-old child was blind from an incomplete bilateral optic atrophy. The mother had had a severe uterine hemorrhage, which lasted four days after childbirth. The optic atrophy is attributed to the anoxemia which followed the hemorrhage. The pathogenesis of anoxemia in the tissues of the fetus after maternal hemorrhage differs from that of ocular anoxemia in the adult after a severe hemorrhage, in that the direct anoxemia of the adult is always accompanied by a variable degree of hypoproteinemia, while in the child the blood protein is normal. There is a latent period between the hemorrhage and the onset of the optic atrophy of several days and the author suggests that repeated ophthalmoscopic observation of the new born might discover the onset of the lesion and institute prompt therapy. This form of optic atrophy is always incomplete and not progressive. Vision improves considerably within the first six years of life, improves slightly between six and 12 years of age, and there is scarcely any perceptible improvement after the age of 12. Treatment consists in dietitic measures, vitamin B, and liver extract. Antibiotic therapy is useless. Prophylaxis consists in prompt delivery when there is severe hemorrhage, in blood transfusions of the mother, and in intense antianemic therapy. (1 figure)

Ray K. Daily.

Costi, C. **Neuro-endocrine craniopathy and stenosis of the optic canals.** Arch. Soc. oftal. hispano-am. **14**:269-276, March, 1954.

Two interesting cases are reported. The first, a woman, 26 years old, recovering from a mild uveitis, was found to have edema of the optic discs, with some hemorrhage, constricted arteries, dilated veins, Gunn's sign, and white foci of exudate in the macula. The diastolic arterial retinal pressure was 55 mm. Hg. and the systolic 110. The general blood pressure was normal. Roentgenography demonstrated a normal sella turcica, hyperostosis frontalis interna, and an increased osseous density of the supraorbital region. The optic foramina were constricted and their outlines blurred, particularly in the left eye. The visual field of the right eye was slightly constricted, and the left field had a marked constriction superiorly, with a central relative scotoma. The general symptoms suggestive of an endocrine involvement were the history of amenorrhea, acne of the face and hypertrichosis of the nipples and extremities.

The second patient, a woman, 19 years old, gave a history of headaches with visual deterioration over a period of two years. The ocular examination revealed a bilateral constriction of the visual fields. The X-ray examination demonstrated a diminished diameter of the optic foramina, and osteosclerosis of their borders. The general examination and history of this patient indicated the presence of an endocrine neuropathy. (9 figures)

Ray K. Daily.

Marin-Amat, Manuel D. **The pupillary reactions and their pathology.** Arch. Soc. oftal. hispano-am. **14**:166-197, Feb., 1954.

A comprehensive review of the literature on the anatomy, physiology, and the pathologic changes of the pupillary reactions is given. The author's observations were made in a tuberculosis hospital patients with tuberculous meningitis. Among 84 patients with tuberculous meningitis, he found 18 cases of pupillary dilatation to light after a brief preliminary constriction.

These occurred in untreated or inadequately treated patients. This anomalous reaction is attributed to a toxic paresis of the parasympathetic, so that the tone of the dilator of the pupil is increased through the impotence of the sphincter of the pupil; in response to light there is an attempt at contraction followed by an immediate dilation. Hipus of the pupil was found in three cases of tuberculous meningitis, out of 100 patients examined. A rare disorder is dilatation of the pupil of the fellow eye when one eye is exposed to light; this was observed in a 15-year-old girl with a fatal tuberculous meningitis shortly before she died, and in a man, 43-years-old, with papillitis and other pupillary disturbances. (3 figures) Ray K. Daily.

Reynon, M. **Herpes zoster ophthalmicus and emetine.** Ann. d'ocul. **187**:467-470, May, 1954.

In the treatment of herpes zoster ophthalmicus by emetine hydrochloride, the author confirms the results published by Griveaud, Achard and Morin and referred to in the bibliography. A single case treated by him showed a dramatic and permanent disappearance of pain after the first injection of emetine, and a complete cure in eight days after four more injections. (1 reference) John C. Locke.

14

EYEBALL, ORBIT, SINUSES

Aguilar Munoz, J., and Del Rio Cabanas, J. L. **Secondary epithelioma of the orbit.** Arch. Soc. oftal. hispano-am. **14**:536-546, May, 1954.

A case report is followed by a review of the literature. The patient, 56 years old, did not seek medical aid until the orbital tumor was very large, with tremendous exophthalmos and loss of vision. He died twenty days after exenteration of the orbit. Microscopic study revealed the nature of the tumor, and at autopsy it was found to have extended into the maxillary sinus and the cranium. The autopsy findings make it probable that the tumor originated in the ethmoidal cells. (13 figures) Ray K. Daily.

De Almeida, Antonio. **Tumors of the orbit.** Rev. brasil. oftal. **13**:147-178, Sept., 1954.

The clinical signs and symptoms of inflammatory tumors, "secondary tumors" (those invading from adjacent cavities and the globe), orbital teratomas, optic nerve tumors, vascular tumors, osseous tumors, and tumors of propagation (sebaceous, dermoids and mucoceles) are presented, together with case histories. In one case of an inflammatory tumor with a microscopic diagnosis of chronic fibromyositis, a cure was accomplished (after previous failure with penicillin, streptomycin, sulfonamides, and antipyogenic vaccine) by fourteen retrobulbar injections of hyaluronidase (75 U. each time together with an anesthetic). (29 figures, 15 references) Theodore Bisland.

Börner, Ruth. **Malignant exophthalmus.** Klin. Monatsbl. f. Augenh. **125**:82-94, 1954.

Four cases are reported, two were in men (69 and 75 years old) who had a high blood pressure; and two in women (53 and 54 years old) who had exophthalmus after a thyroidectomy. One eye was lost and the enucleated globe showed that the orbital inflammatory process had involved the optic nerve. This process probably accounts for the visual impairment in many of these patients. (12 figures, 51 references) Frederick C. Blodi.

Fornes, E. **Histopathology and clinical symptoms of ocular granuloma.** Arch. Soc. oftal. hispano-am. **14**:392-404, April, 1954.

The author illustrates the frequency of granulomatous lesions of the lids and the eyeball with brief reports of 19 cases. Not infrequently eyeballs containing granu-

lomatous lesions are enucleated with the diagnosis of a malignancy. The author emphasizes that the best means of a differential diagnosis in intraocular lesions is a careful history, and in suprabulbar lesions and lesions of the lids a biopsy. (9 figures) Ray K. Daily.

Galindez Iglesias, F. **Orbitonometry.** Arch. Soc oftal. hispano-am. **14**:141-165, Feb., 1954.

The literature on the development of orbitonometry is reviewed, and Cooper's orbitonometer, which the author uses and which combines the merits of all the previous orbitonometers, is described in detail. Orbitonometry is a valuable diagnostic aid in intraorbital pathologic processes, and is of value in the investigation of the disturbances of function of some endocrine diseases, especially those of the thyroid and hypophysis. The orbitonometric curve is of great value in demonstrating the degree and course of the ocular displacement under pressure, and the state of the retrobulbar tissues, and provides an objective means for following the evolution of the exophthalmos. In the author's experience, patients were very intolerant to pressure exceeding 300 grams. The author's material consisted of 70 cases of orbital lesion, of which eight were pituitary in origin, two occurred after thyroidectomy, three after thiouracil therapy, two associated with Maranon's syndrome of adiposity, Basedow's syndrome, and distermia, and the rest in patients with hyperthyroid and goiter. The proptosis was most pronounced in cases of pituitary exophthalmos, in which the orbitonometric curves were quite flat, indicating a strong resistance of the retrobulbar tissues. In one case with an exophthalmos of 26 mm. the left eye had to be enucleated because of the fulminating destruction of the cornea. In another case the exophthalmos receded 2 mm. under the administration of ACTH. In the exophthalmos after thyroidectomy the curve declined more sharply than in the first group. In Maranon's syndrome the exophthalmos was moderate and the curves showed less retro-orbital resistance. In the other hyperthyroid patients, the curves were sloping. The author's results are similar to those published in the literature. He divides the endocrine exophthalmos into two large groups: 1. the pituitary-hypothalamic exophthalmos which is characterized by an intense exophthalmos and intense retrobulbar resistance, caused by a marked retro-ocular infiltration, and 2. the second group, comprizing all non-malignant exophthalmos, when the retrobulbar infiltration is slight, the exophthalmos is moderate, and the curves are almost normal. (9 figures, 16 references) Ray K. Daily.

Schwab, F. **A new material for implantation after enucleation.** Klin. Monatsbl. f. Augenh. **124**:697-704, 1954.

The author uses Polystan, a polymer ethylene derivative. It is a sponge-like material which is cut into a droplet form. It was successfully used in 16 cases. The smooth and bland healing process was remarkable. (1 figure, 1 table, 31 references) Frederick C. Blodi.

15

EYELIDS, LACRIMAL APPARATUS

Ambos, Ernst. **Endonasal probing of the lacrimal sac.** Klin. Monatsbl. f. Augenh. **124**:705-710, 1954.

The author advises the introduction of a polyethylene tube into the lacrimal duct in cases of partial stricture. Instead of repeated probings this tube is left in place for several months and then removed through the nose. The tube is inserted from the nose along a guiding metal wire. This wire is first introduced within a narrow plastic tube from the upper punctum. (6 figures, 11 references) Frederick C. Blodi.

Aznarez. **Dacryocystorhinostomy with a continuous suture and permanent drainage.** Arch. Soc. oftal. hispano-am. **13**:1459-1470, Dec., 1953.

The principal steps of the author's technique, developed out of an experience in over 200 operations for which he claims complete success, are: 1. the usual skin incision; 2. incision into the sac, and introduction into it of a ball-tipped probe; tying a suture with a sailor's knot to the tip of the probe, and withdrawing the probe through the canaliculus, leaving the suture protruding from the canaliculus; 3. making a large opening into the nose anteriorly and low with chisel or drill; 4. fashioning a flap of nasal mucosa, to be sutured to the anterior wall of the sac; 5. introduction of the probe into the wound from the nose, tying the suture again over the tip, and withdrawing the probe through the nasal vestibule (this drain through the canaliculus and the nose, both ends of which are held with adhesive plaster on the cheek, is left in place 10 to 15 days. The author learned this procedure in Castroviejo's clinic, and found that the addition of this drain greatly improved the results of the operation) and 6. suturing of the nasal mucosa to the mucosa of the sac; the ends of the sutures are passed through the skin and tied on one side of the cutaneous incision. If the nasal mucosa tears in the course of making the osseous opening between the nose and the sac, the author excises the nasal mucous membrane around the opening completely, and sutures the sac wall to the periosteum. The result is equally good. The skin sutures are removed when the wound is healed, the mucous membrane sutures in six days. (10 figures)

Ray K. Daily.

Bruna, F. **Herpetic blepharitis.** Boll. d'ocul. **33**:356-367, June, 1954.

The author describes three patients (photographs) with herpetic blepharitis which is a rather rare disease and may be complicated by conjunctivitis and keratitis. He assumes that his cases, which occurred mainly in children and young people, represent a primary localization of the virus. (3 figures, 10 references)

K. W. Ascher.

Bruna, F. **Tumors of the nasal lid angle. Carcinoma deriving from the caruncle.** Boll. d'ocul. **33**:236-248, April, 1954.

A case with three photomicrographs is presented. The tumor was of high malignancy, invaded the orbit rapidly, and destroyed the orbital roof in spite of two operations followed by high-dosage Roentgen treatment. Histologically, two cell types were found, one with spongy vacuolized cytoplasm, the other with homogeneous smaller cells similar to basal cell carcinoma. (3 figures, 25 references)

K. W. Ascher.

Kettesy, A. **Ptosis operation of Blaskovics.** Klin. Monatsbl. f. Augenh. **124**: 641-660, 1954.

The author gives a concise description of this operation, well illustrated with schematic drawings. Six stages of the procedure are distinguished. A few facts are especially emphasized: the lid should be everted with a Dasmarres elevator, all the layers between the conjunctiva and the skin are dealt with as an entity (the "middle plate"), and the excision of the tarsus follows a straight line. The operation is not as complicated as the description sometimes sounds. Many of the complications can be avoided, if the original method is followed. Though this operation is not ideal (the upper lid may, for instance, lag when looking down), it is the method of choice in all cases of ptosis. (16 figures, 33 references)

Frederick C. Blodi.

Kruger, Karl-Ernst. **Congenital absence of tearing in a family.** Klin. Monatsbl. f. Augenh. **124**:711-713, 1954.

Three siblings showed a lack of tearing, ptosis, and other minor ocular anomalies.

The parents were first cousins and the father was supposed to have had dry eyes while alive. (2 figures 11 references)

Frederick C. Blodi.

Marin-Amat, M. **A revival and revaluation of probing of the lacrimal passages.** Arch. Soc. oftal. hispano-am. **13**:1446-1458, Dec., 1953.

Marin-Amat believes that probing of the lacrimal passages has become an obsolete procedure unjustly, and that many patients who are submitted to radical lacrimal sac surgery can be cured by judicious and careful probing. In his opinion, the procedure has fallen into disrepute mostly because of faulty anesthesia and technique. He stresses the importance of thorough anesthesia and gentle probing, avoiding all damage to the mucous membrane of the sac. He advocates this procedure for epiphora caused by mechanical obstruction, for partial stenosis of the lacrimal passages, for recent dacryocystitis, and even in some cases of lacrimal fistula. Probing is contraindicated in impermeable stenosis of the lacrimal sac, and in acute inflammations. He condems irrigation after probing as unnecessary and illogical.

Ray K. Daily.

Mata Lopez, Pedro. **Therapy of dermatoses of the lids.** Arch. Soc. oftal. hispano-am. **14**:311-347, March, 1954.

This is an exhaustive monograph on the therapy of diseases of the lids. They are divided into three groups: 1. those caused by physical, chemical, or biologic agents; 2. those due to a disturbance in the cellular reactivity; and 3. the dystrophies. They are divided also topographically into those affecting the palpebral region, with the exception of the ciliary border, and those involving the ciliary border exclusively. The therapeutic agents useful in each group are enumerated and no specific agent is mentioned for any particular disease. Attention is called to the various general diseases associated with diseases of the lids and the therapy indicated. (54 references) Ray K. Daily.

Perez-Bufill. **A rare case of acute dacryocystitis.** Arch. Soc. oftal. hispano-am. **14**:120-121, Jan., 1954.

The author reports an interesting case of acute dacryocystitis caused by a plug of organized exudate. After the sac was anesthetized and shrunk with adrenalin, the plug which formed a cast of the lacrimal sac was discharged into the nasopharynx. The patient had a recurrence of the same episode one year later.

Ray K. Daily.

Pettinate, Sergio. **Axial projection in radiography of the bony naso-lacrymal canal.** Rassegna ital. d'ottal. **23**:232-240, May-June, 1954.

The radiation of the lacrimal duct and passages is greatly facilitated by making the projection correspond to the normal axis of the canal. Introducing an artificial prosthesis into the canal, such as a tube of vitallium further aids the visualization of the passageway. The method is simple, safe, and useful. (4 figures, 5 references) Eugene M. Blake.

Urrets-Zavalia, A., and Urrets-Zavalia, A., Jr. **Intubation as a practical means of restoring the patency of the nasolacrimal duct.** Arch. oftal. Buenos Aires **29**:91-98, Feb., 1954.

Management of strictures of the nasolacrimal duct with tubes of vitallium or of a synthetic plastic material represents a safe, simple and anatomical method of restoring its patency. Except in young children, the operation can be easily carried out under local anesthesia. An incision is made through the skin and the tear sac wall; the nasolacrimal passage is scraped with a fine curette and a tube of appropriate size is inserted into the osseous duct and abandoned in situ; the sac is then closed with two or three stitches

of plain catgut and the skin is sutured with silk.

Only those cases—two in number—which had been followed for no less than a year and a half are presented; in both, a most gratifying result was attained. As experience with this procedure is still limited, any final estimation of its absolute or relative merits would be premature. However, the abstractor feels it his duty as one of the authors to remark at this time that the sum of the collected evidence is now far less encouraging than it was one year ago. Lacrimation and discharge have been seen to recur in some cases, because a secondary obstruction, due to granulations of the mucous membrane, blocked the upper end of the canula. (4 figures, 16 references)

A. Urrets-Zavalia, Jr.

16

TUMORS

Binder, Rudolf. **Simultaneous occurrence of a choroidal melanoma and a branchiogenic carcinoma.** Klin. Monatsbl. f. Augenh. **125**:103-104, 1954.

A 46-year-old man had a malignant melanoma of the right uvea and a branchiogenic carcinoma of the right side of the neck. (8 references)

Frederick C. Blodi.

François, J., and Rabaey, M. **Study of the basophilia of sarcomas of the uvea.** Ann. d'ocul. **187**:451-460, May, 1954.

The authors measure basophilia by determining the amount of methylene blue absorbed by sections of the tissue in question. In a study of 10 choroidal sarcomas, they found the degree of basophilia to be much higher than that of normal tissues, although the values varied considerably from one sarcoma to another. No direct relationship was found to exist between basophilia and pigmentation; but the basophilia was directly related to the metastatic and infiltrative capacities of the growth. (8 figures, 1 table, 15 references)

John C. Locke.

Martelli, Aldo. **Angioblastoma of the orbit.** Gior. ital. oftal. **7**:235-248, May-June, 1954.

Two cases of orbital angioblastoma, and a relapse in one of them, are described. The shape and histology of the tumors are discussed; it is suggested that the three represent angioblastomas in different stages of maturity: hyperplastic angioma, hemangioendothelioma, and solid endothelioma. In view of their histology, and of the fact that one of them was a relapse, it is presumed that tumors can pass from one stage to the other under determined stimuli. (8 figures, 26 references)

V. Tabone.

Moro, F. **Histogenesis and clinical course of malignant choroidal melanoma.** Boll. d'ocul. **33**:270-289, May, 1954.

This is an extensive review of current opinion about the relationship between microscopic structure and malignancy of the choroidal tumors. (6 tables, 68 references)

K. W. Ascher.

Weve, H. **The diathermy treatment of intraocular tumours.** Tr. Ophth. Soc. Australia **13**:47-58, 1953.

Diathermy coagulation of a small retinoblastoma may be successful but for large growths X radiation seems more favourable. Melanoblastomata not larger than seven to eight disc diameters, some malignant melanomas, and choroidal andiomas can be satisfactorily treated with diathermy coagulation. The results are also excellent in angiomatosis, which should always be treated because there is a tendency for involvement of both eyes. Weak currents should be applied for a relatively long time with proper intervals between each application to avoid overheating of the blood vessels.

Ronald Lowe.

17
INJURIES

Belmonte Gonzalez, Nicolas. **Metallic intraocular foreign bodies in agriculture.** Arch. Soc. oftal. hispano-am. **14**:521-528, May, 1954.

Experience with 105 penetrating ocular injuries among agricultural workers leads the author to regard them as grave because of the frequency of infection from the soil and the consequent high percentage of loss of the eye. Agricultural injuries are fairly uniform in type because the fragments broken off from the heavy agricultural instruments have a uniform size and form; they strike the eye from a fixed distance and with the same force. For localization of the intraocular foreign bodies the author finds Goldmann's ring most accurate. The foreign bodies are usually retained in the anterior and inferior portion of the eyeball, because the force with which they strike is not adequate to drive them further. Belmonte maintains that in extraction of these foreign bodies, it is important to have a magnet the point of which can be inserted into the globe. If the magnetic force is applied outside the eyeball it will attract only foreign bodies immediately behind the scleral incision. Ray K. Daily.

Kjer, Poul. **Orbital and transorbital stab wounds.** A.M.A. Arch. Ophth. **58**:811-821, June, 1954.

This paper is concerned with wounds of the orbit from sharp penetrating objects. Such wounds may show little external evidence of injury but may be associated with severe neurological complications as a result of brain injury and sepsis. A series of 15 patients is presented of whom three died and nine had intracranial complications. (7 tables, 15 references)

G. S. Tyner.

Oksala, Arvo. **EDTA in the treatment of calcium injuries of the eye.** Klin. Monatsbl. f. Augenh. **125**:99-102, 1954.

Following Grant's experiences the author made some experiments on freshly enucleated steer eyes. These were injured with calcium oxide and then treated with EDTA, distilled water and other solutions. After one hour the EDTA-treated eyes cleared considerably. EDTA was also used in human eyes after fresh calcium injuries. (1 figure) Frederick C. Blodi.

Roper-Hall, M. J. **Intraocular foreign body.** Brit. J. Ophth. **38**:65-99, Feb., 1954.

A review of 555 cases of intraocular foreign bodies seen in 19 years is presented. There has been a reduction in the number of cases requiring excision from 29.8 percent in the first five-year group to 14.2 in the fourth group. The greatest incidence, and highest incidence of magnetic foreign bodies, occurred between the ages of 21 and 40 years. The great majority of injuries were the result of the patient's own action; 73 percent were hand-hammer injuries and 89 percent of the foreign bodies were magnetic. Of the eyes with nonmagnetic foreign bodies 27 percent required enucleation. The complications increase directly with the diameter of the foreign body. Twice as many small foreign bodies are found in the right eye as in the left and 6 times as many large ones enter the left eye. Most excisions were carried out within the first three months. The foreign body should be removed as early as possible, but not before full investigation and localization. With a longer delay there is a progressive increase in the number of patients with vision less than 6/60. Possibly, results are better if the eye is given time to recover from the insult of the accident before being exposed to the trauma of the operation. In a number of the uncertain cases the foreign bodies were in fact magnetic, and subclinical siderosis occurred, affecting the retina and causing poor visual acuity. There were 25 cases of siderosis; the

foreign body was successfully removed in 15, but in only three did the vision improve. Visual improvement is often seen after cataract extraction in siderotic eyes.

The final visual results appear to show that the posterior route gives better results in spite of the fact that the cases with the foreign body in the anterior segment are expected to give the anterior route an advantage. Postoperative retinal detachment and vitreous hemorrhage occur more frequently after posterior route extraction, but the posterior route gave significantly better results; just over twice as many posterior route extractions achieved full recovery. There is less risk of loss of the eye and a better chance of return to normal function if the posterior route is used. The frequent association of retinal detachment and intraocular hemorrhage may be ascribed to retinal injury associated with a vitreous disturbance due to hemorrhage. Where retinal detachment was present preoperatively, the results are overwhelmingly in favor of the anterior route of removal. It was surprising that so many detachments subsided spontaneously. The final visual results are disappointing after retinal detachments and even where re-attachment occurred. There has been a progressive reduction in the rate of excision of the globe during the past 20 years, which appears to be due to better control of infection. Postoperative infection is very much reduced and, surprisingly, is less frequent in posterior than in anterior extractions. It is highly inadvisable to remove vitreous foreign bodies greater than 1 mm. in any dimension by the anterior route, especially when the lens is undamaged. Cataract extraction in cases with siderotic cataract has often led to a satisfactory result. The finding of uveal prolapse should not be regarded as evidence against the presence of an intraocular foreign body. A uveal wound without a prolapse does not alter the general prognosis. The presence of cataract does not markedly increase the risk of loss of the eye, but considerably reduces the possibility of good final vision.

Orwyn H. Ellis.

18

SYSTEMIC DISEASE AND PARASITES

Alagna, G. **Experimental diabetes mellitus and the eye.** Arch. di. ottal. **58**:203, May-June, 1954.

After reviewing the literature concerning the ocular complications of experimental diabetes, the author summarizes his own investigations as follows (without describing the details of his experiments): in Alloxan diabetes, cortisone aggravates and desoxy-corticosterone alleviates the symptoms, including the lenticular opacities. In Ditizone diabetes, BAL, nicotinic acid, riboflavin, vitamin E and particularly ACTH have an ameliorating effect on the development of cataract and chorioretinitis. While similarities exist between the diabetogenic cataract of experimental animals and man, the same cannot be said as yet of the diabetic retinopathy.

John J. Stern.

Bässler, H. **Bilateral optico-retinal arteritis in temporal arteritis.** Klin. Monatsbl. f. Augenh. **125**:104-105, 1954.

An 81-year-old man with temporal arteritis became suddenly blind. Both discs were yellowish-gray and blurred. Grayish-white retinal foci could be seen along the retinal vessels. Treatment was of no avail. The headaches ceased when the blindness occurred. Frederick C. Blodi.

Brihaye-van Geertruyden, M., Danis, P., and Toussaint, C. **Fundus lesions with disseminated lupus erythematosus.** A.M.A. Arch. Ophth. **51**:799-810, June, 1954.

The clinical findings noted during one year in a patient with lupus and a histopathologic study of the eyes removed shortly after death are reported. The soft white spots observed in the retina by

ophthalmoscopic examination are evanescent and cyclic in character. There is a parallelism between the appearance of the white spots and aggravation of the general state, but the cycle does not seem to have any connection with the evolution of the general condition. The spots are identified as cytoid bodies in the nerve fiber layer of the retina. In histologic section they are conglomerations of globular elements between the nerve fibers. (10 figures, 40 references) G. S. Tyner.

Casanovas, J., and Domenech, J. **The ocular symptoms of acrodynia.** Arch. Soc. oftal. hispano-am. **14**:131-140, Feb., 1954.

The literature is reviewed, and two cases reported. The characteristic symptom of the disease is an intense photophobia, without any organic lesion to account for it. The authors report two cases, one a child of nine months, who recovered under therapy with vitamins and liver, and the other an infant of eleven months, who recovered under treatment with vitamin B_6 and Bellergal. (3 figures, 34 references) Ray K. Daily.

19

CONGENITAL DEFORMITIES, HEREDITY

Bruna, F. **Association of conical cornea and retinosis pigmentosa.** Boll. d'ocul. **33**:145-157, March, 1954.

The author adds one observation to the rare syndrome of keratoconus with retinosis pigmentosa. The younger brother of the 36-year-old patient was affected by retinosis pigmentosa and was slightly imbecile. Three other brothers and two sisters were normal. Since the age of seven years, the patient developed hemeralopia, and retinosis pigmentosa was diagnosed. At the age of 13 years bilateral keratoconus was found. When 15 years old he showed unusual fatigability; he showed muscular hypotony, hypogenitalism, and pigmentations on his back and abdomen, while his skin otherwise appeared unusually pale. At the age of 36 years, both discs were of waxy color, the retinal vessels extremely narrow and severe degeneration of both retinas was present. Intraocular pressure was normal and there was no light perception. The basal metabolism was −15; there was hypercholesterolemia, diminished iodine content of the blood serum, a reduction of the urinary oxycorticoids, desoxycorticoids, and ketosteroids. Sugar tolerance was increased and so was the insulin response. The author concludes that the primary lesion responsible for the systemic inadequacies as well as for retinosis pigmentosa and keratoconus was located in the diencephalo-hypophyseal complex. (29 references) K. W. Ascher.

François, J., and Haustrate, L. **Colobomatous anomalies of the eyeball, and the first branchial arch syndrome.** Ann. d'ocul. **187**:340-368, April, 1954.

The authors report a case of aplasia of the ascending branch of the mandible with malformation of the temporo-maxillary articulation, malformation of the lobe of the ear, atrophy of the external auditory meatus, supernumerary auditory cartilage and lastly microphthalmos with coloboma of the uveal tract and of the optic disc. This is a typical case of mandibular dysostosis, the name under which the authors have tried to group different scattered cases of associated malformations of the lower jaw and of the external ear, that is to say, a variety of facial dysostosis, which can be compared with mandibular-facial dysostosis and which, just as the latter, depends on a genetic factor. This is proved by the coexistence in the same family of fissure lesions and dysontogenetic troubles. The association of colobomatous anomalies of the ocular globe shows a link between the developmental anomalies of the optic cup and those of the first branchial arch.

The authors have collected together,

under the name of syndrome of the first arch, different forms of facial dysostosis (mandibular dysostosis, mandibular-facial dysostosis, dysostosis of the Streiff-Hallerman type, otocephaly), which all present the same fundamental sign: an aplasia of the mandible. (10 figures, 116 references) John C. Locke.

Roveda, J. M., and Iribarren, R. **Vogt-Stock-Spielmeyer's disease. Report of a case.** Arch. oftal. Buenos Aires **29**:81-88, Feb., 1954.

Vogt-Stock-Spielmeyer's disease is a late infantile form of amaurotic family idiocy, which affects one or several siblings and consists of a cerebral degeneration with symmetrical macular changes. All symptoms and signs (visual deterioration which ends in complete or almost complete blindness, epileptiform seizures, disturbances of speech, motor troubles of an extrapyramidal nature, and mental failure terminating in idiocy) appear at about the time of the second dentition and progress slowly until death supervenes at the age of 18 or 20. Initially, fundus examination reveals only an attenuation of the retinal vessels and a peculiar discoloration of the disc, which shows a grayish or yellowish, wax-like tinge; at a later stage, peripheral pigmentary changes set in and progress rapidly toward the posterior pole; sometimes the picture is similar to that of retinitis pigmentosa. Like the better known infantile type (Tay-Sachs' disease), which has its onset during the first year of life and presents an entirely different ophthalmoscopic picture, the condition must be considered a form of thesaurismosis in which deposits of lipoid substances (probably phosphatides) take place within the ganglion cells of the central nervous system and the retina. Recovery has never been observed.

A typical case is reported as occurring in a boy, seven years of age.

A. Urrets-Zavalia, Jr.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Aguilar Bartolome, Jose M. **Terramycin in ophthalmology.** Arch. Soc. oftal. hispano-am. **14**:65-73, Jan., 1954.

This is a review of the literature. (5 tables, 9 references) Ray K. Daily.

Marshall, John. **Ophthalmic nursing.** Tr. Ophth. Soc. U. Kingdom **73**:555-564, 1953.

The author discusses the development of the nursing profession from the time of Florence Nightingale in 1858 in England. Certificates for competence in ophthalmic nursing were issued by Moorfields in 1816; however, it was not until 1912 that the first real certificate was issued. Recently some 20 hospitals have been issuing certificates for nurses who underwent the extra year of training in the ophthalmic department. Beulah Cushman.

Montanelli, M. **Impressions of an ophthalmologist visiting the exhibition of Giovanni Bellini's paintings in Venice, 1949.** Boll. d'ocul. **33**:305-315, May, 1954.

This article contains six reproductions of Bellini's works and describes ocular and other abnormalities in these masterpieces. K. W. Ascher.

Sebas, S. Raphael. **Hemeralopia and nictalopia.** Rev. brasil oftal. **13**:87-89, June, 1954.

A discussion of the differences in definition of the words (according to their Greek derivations) and their actual meaning as applied in ophthalmology is presented. (7 references)

Theodore Bisland.

Williams, D. A. **A review of some of the affairs of the Ophthalmological Society of Australia (B.M.A.)** Tr. Ophth. Soc. Australia **13**:19-34, 1953.

A summary of the activities of the society from its commencement in 1938 is given. Ronald Lowe.

NEWS ITEMS

Edited by Donald J. Lyle, M.D.
601 Union Trust Building, Cincinnati 2, Ohio

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notice of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

Announcements

Stanford spring postgraduate conference

Stanford University School of Medicine will present the annual postgraduate conference in ophthalmology from March 21 through March 25, 1955. Registration will be open to physicians who limit their practice to the treatment of diseases of the eye; or eye, ear, nose, and throat. In order to allow free discussion by members of the conference, registration will be limited to 30 physicians.

Instructors will be Dr. A. Edward Maumenee, Dr. Dohrmann K. Pischel, Dr. Jerome W. Bettman, Dr. Max Fine, Dr. Earle H. McBain, and Dr. Arthur J. Jampolsky.

Programs and further information may be obtained from the Office of the Dean, Stanford University School of Medicine, 2398 Sacramento Street, San Francisco 15, California.

Wills clinical conference

The seventh annual clinical conference of the staff and ex-residents of the Wills Eye Hospital will be held at the hospital, 1601 Spring Garden Street, Philadelphia 30, Pennsylvania, on February 18 and 19, 1955.

The Arthur J. Bedell Lecture will be delivered by Dr. Algernon B. Reese of New York. The subject of Dr. Reese's paper will be "The diagnosis and treatment of orbital tumors and simulating lesions."

Corneas for transplantation

The Buffalo Eye-Bank and Research Society, Inc., University of Buffalo Medical School, 3435 Main Street, Buffalo 14, New York (telephone, Windsor 8725), announces that it will supply on request, as available, eyes suitable for corneal transplantation (enucleated within one to two hours after death) to any part of the United States. The eyes are transported in a special container which prevents waterlogging or drying and keeps them at 3.0 to 5.0°C. for 30 hours. Via airplane and Red Cross Mobile Unit, where available, the container will reach almost any ophthalmologist in the United States in 12 hours.

New Orleans Academy

Featured at the midwinter convention of the New Orleans Academy of Ophthalmology, January 31 to February 4, 1955, will be a symposium on ocular motility. Guest speakers will be: Dr. Francis Heed Adler, Philadelphia; Dr. Walter H. Fink, Minneapolis; Dr. Harold W. Brown, New York; Dr. George P. Guibor, Chicago; Dr. Kenneth C. Swan, Portland, Oregon; Dr. Frank D. Costenbader, Washington, D.C.; Dr. Hermann M. Burian, Iowa City, Iowa; and Dr. Philip C. Knapp, New York.

The registration fee of $75.00 includes associate membership in the New Orleans Academy for the year 1955. Hotel reservations should be made now by writing directly to the Jung Hotel, 1500 Canal Street, New Orleans, Louisiana, or to the New Orleans Academy of Ophthalmology, 211 South Saratoga Street.

Early glaucoma eyes wanted

The Eye-Bank for Sight Restoration, Inc., 210 East 64th Street, New York 21, New York, is in need of more eyes from early glaucoma cases for research. The eyes must be removed promptly before degeneration occurs and should be shipped in formalin. The Eye-Bank will be glad to section the eyes and return after study.

Societies

American College of Surgeons

At the recent clinical congress of the American College of Surgeons held at Atlantic City, panel discussions were held on the following subjects:

"Surgical management of diseases of the cornea"—Moderator: Dr. Rudolf Aebli, New York. Collaborators: Dr. William B. Clark, New Orleans; Dr. Herbert M. Katzin, New York; Dr. Brendan D. Leahey, Lowell, Massachusetts; Dr. R. Townley Paton, New York.

"Minor surgical problems of the eye and adnexa"—Moderator: Dr. Robison D. Harley, Atlantic City. Collaborators: Dr. Irving H. Leopold, Philadelphia; Dr. Homer R. Mather, Latrobe, Pennsylvania; Dr. John M. McLean, New York.

"Selection of operative technique in retinal separation"—Dr. Harold G. Scheie, Philadelphia; Collaborators: Dr. Paul A. Chandler, Boston; Dr. John W. Henderson, Rochester, Minnesota; Dr. William F. Hughes, Jr., Chicago.

Several ophthalmology motion pictures, with narration by the authors, were shown. Dr. Harold G. Scheie, Philadelphia, presided.

Reading meetings

At the 144th meeting of the Reading (Pennsylvania) Eye, Ear, Nose, and Throat Society, members who attended the annual meeting of the American Academy of Ophthalmology and Otolaryngology in New York reported briefly on the courses and lectures.

The 145th meeting of the Reading society was

held jointly with the Berks County Medical Society at Medical Hall, Reading. Dr. Francis Heed Adler, Philadelphia, was guest speaker at the 146th meeting. The subject of Dr. Adler's address was "Evaluation of arteriosclerosis and hypertension by the ophthalmologist."

Washington (D.C.) officers

The following officers of the Section on Ophthalmology, the Medical Society of the District of Columbia, have been elected for the 1954-1955 term: President, Dr. Robert L. Norment; vice president, Dr. William D. Foote; secretary-treasurer, Dr. Robert E. Duprey; executive committee, Dr. J. Spencer Dryden and Dr. M. Noel Stow.

Meetings have been scheduled for February 8 and April 12, 1955.

New Jersey meeting

Dr. C. Byron Blaisdell, chairman of the Board of Trustees of The Medical Society of New Jersey, was guest of honor at the dinner which was held before Dr. Hubert N. Alyea, Princeton University, addressed the members of the New Jersey Ophthalmological Society at the November meeting. Dr. Alyea spoke on "Atomic energy: Weapon for peace."

Elected to honorary membership of the society were Dr. H. L. Harley, Atlantic City, and Dr. E. S. Sherman, Newark. Officers elected for 1955 are: Dr. George P. Meyer, Camden, president; Dr. Lee W. Hughes, Newark, vice president; Dr. Charles E. Jaeckle, East Orange (136 Evergreen Place), secretary; Dr. Jay E. Mishler, Atlantic City, treasurer; Dr. Louis A. Amdur, Jersey City, and Dr. Edward A. Atwood, Paterson, directors. Dr. A. Russell Sherman, retiring president, presided.

Canadian society officers

At the 17th annual meeting of the Canadian Ophthalmological Society, the following officers were elected: President, Dr. P. B. Macfarlane, Hamilton, Ontario; vice president, Dr. Henri Pichette, Quebec, Quebec; secretary, Dr. R. G. C. Kelly, Toronto; treasurer, Dr. John V. V. Nicholls, Montreal, Quebec; editor-in-chief of the *Transactions*, Dr. Clement McCulloch, Toronto.

Nassau program

At the scientific session of the recent meeting of the Nassau Ophthalmological Society, at Bellmore, New York, Dr. A. Gerard DeVoe, New York, presented a paper on "Ocular tumors."

Brooklyn meeting

At the 130th regular meeting of the Brooklyn Ophthalmological Society, the following papers were presented: "Indications and operative technique for lamellar and penetrating corneal transplants," Dr. R. Townley Paton; and "Successful corneal transplants in lattice dystrophy," Dr. Joseph Laval. The discussion was led by Dr. Ralph I. Lloyd.

Milwaukee society

Dr. Erwin E. Grossmann was elected president of the Milwaukee Oto-Ophthalmic Society for 1954-1955. Other officers are: vice president, Dr. Donald T. Hughson; secretary-treasurer, Dr. Howard V. Morter. Meetings are held the fourth Tuesday of the month at 6:00 P.M. at the Milwaukee University Club.

Central Illinois meeting

The 23rd convention of the Central Illinois Society of Ophthalmology and Otolaryngology was held at the Urbana Lincoln Hotel, Urbana, Illinois. Among the papers presented were: "Encephalitis following tonsillectomy," Dr. G. E. Hartenbower, Bloomington; "Glaucoma surgery," Dr. Jack S. Guyton, Detroit; "Some aspects of nasal physiology," Dr. Maurice H. Cottle, Chicago; "Spontaneous rupture of the lens capsule," Dr. Robert L. Cannon, Galesburg; "Ptosis surgery," Dr. Jack S. Guyton.

Officers of the society are: President, Dr. George Woodruff, Joliet; president-elect, Dr. Perry Duncan, Springfield; vice president, Dr. Walter Owen, Peoria; secretary-treasurer, Dr. Clarence A. Fleischli, Springfield.

Personals

Dr. F. Phinizy Calhoun, Atlanta, received the honorary degree of doctor of laws at Emory University's medical centennial celebration. Dr. F. Phinizy Calhoun, Jr., chairman, department of ophthalmology, assisted in conferring the degree on his father who has practiced more than 50 years in Atlanta.

Dr. Conrad Berens, New York, presented the 17th annual deSchweinitz Lecture before the Section on Ophthalmology of the College of Physicians of Philadelphia. The subject of Dr. Berens' lecture was "Results of operations for glaucoma: With special reference to cycloelectrolysis and iridocorneosclerectomy."

Dr. Derrick Vail, Chicago, was recently elected second vice president of the American College of Surgeons.

Dr. G. L. Scott, University of Edinburgh, has been appointed to the new Forbes chair of ophthalmology at the university. The W. H. Ross Foundation for the Study of Prevention of Blindness is contributing toward a research unit to be associated with the chair.

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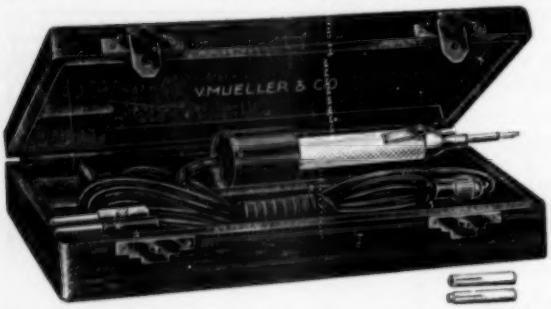

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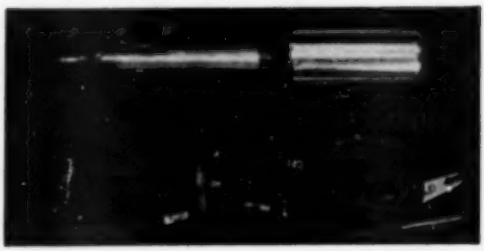

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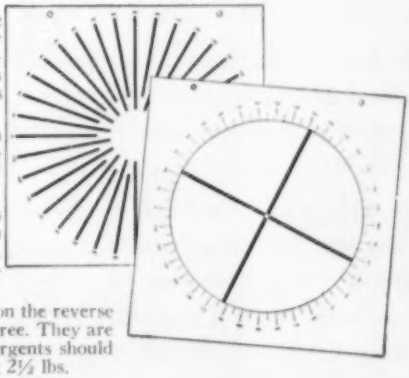

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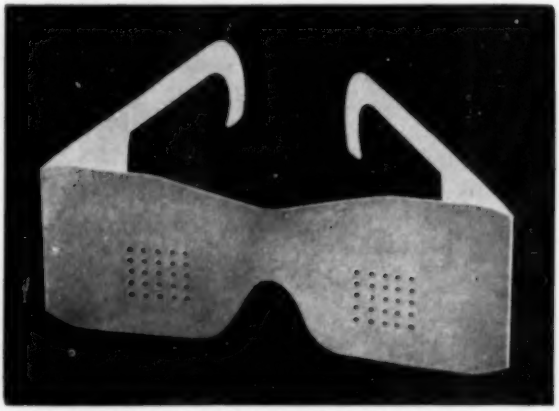

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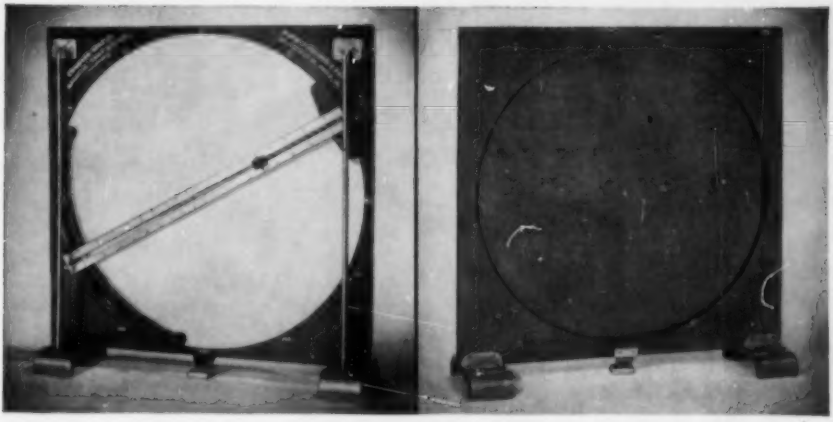

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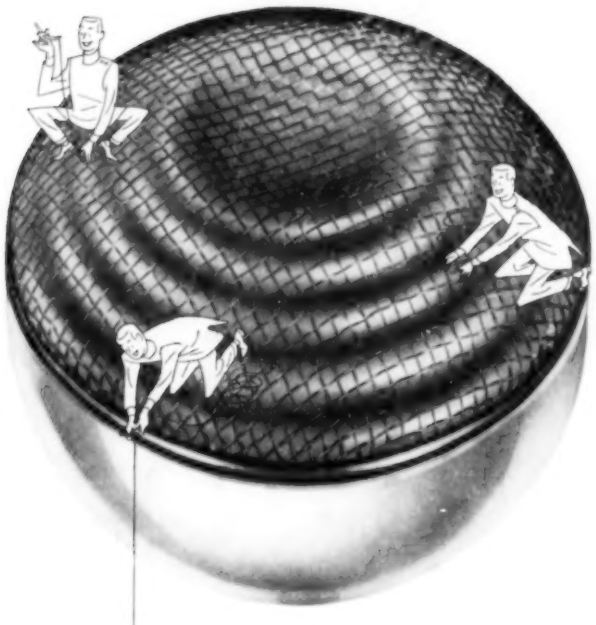

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